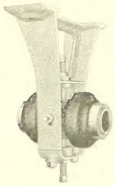
CANADIAN MACHINERY AND MANUFACTURING NEWS

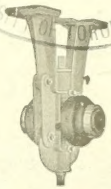
A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 19. Publication Office: Toronto, May 8, 1919 Subscription Price $3.00 per Year

ARCHIVE JUN 16 1922 UNIVERSITY OF TORONTO







Friction Practically Eliminated

Lubrication Costs of No Account

Chapman Double Ball Bearings

Chapman Double Ball Bearings are purposely designed to overcome two causes of great expense experienced in the use of plain bearings.

Fit all standard hanger frames and are interchangeable with self-oiling box of same size.

First—reduction of friction load, an evil which wastes countless units of power in the course of a year.

Second—reduction of a large amount of oil and attention required to make the bearings give proper service.

An ever-increasing demand for Chapman Bearings indicates that they are fulfilling their purpose to the letter.

Users save 75% of friction loss in transmitting power, and as they require oiling not more than twice a year much time and oil expense is saved.

That's the kind of economy you want in your plant! Decide to adopt Chapman Bearings without delay.

We also manufacture Annular and Thrust Bearings for automobiles and machinery.

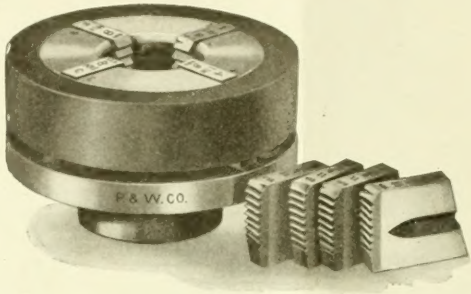
Chapman Double Ball Bearing Co. of Canada, Limited

339-351 Sorauren Ave., Toronto, Ont.

Transmission Ball Bearing Co., Inc.
32 West Street, Buffalo, N.Y.

C C

SMALL TOOLS



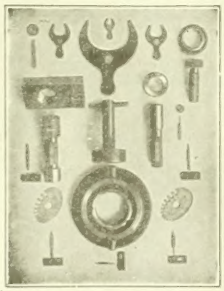
PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

P. & W. Die-Stock Dies

These dies are practically solid when in use and can be adjusted 1-32 in. larger or smaller. The chasers can be quickly removed for the purpose of renewal or sharpening. Standard sizes furnished include U. S. Standard, Whitworth Standard, S. A. E. Standard and "V" form, all right hand; also special right-hand Briggs Standard taper pipe thread.

The Pratt & Whitney policy of highest quality materials, together with the necessary refinement and accuracy, is maintained.



PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

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BERTRAM MACHINE TOOLS

42-inch Vertical Boring and Turning Mill

Motor driven through speed box. Built in sizes from 42-inch to 100-inch.

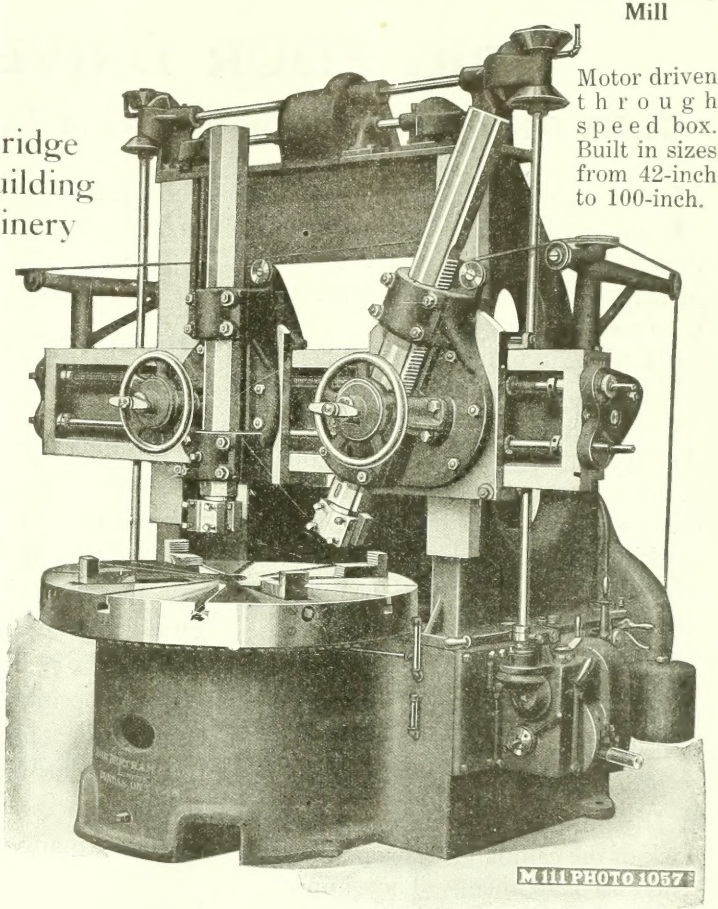
Structural Bridge Shop Shipbuilding Plant Machinery

Locomotive and Car Shop Equipment

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General Machine Shop Equipment

Drop us a line for Photographs and full particulars.



The John Bertram & Sons Company Limited

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MONTREAL 723 Drummond Bldg. TORONTO 1002 C.P.R. Bldg. VANCOUVER 609 Bank of Ottawa Bldg. WINNIPEG 1205 McArthur Bldg.

The Publisher's Page

TORONTO APRIL 8, 1919

BIG FOUR DRIVE

$1,500,000 in Four Days in the City of Toronto Alone

THINK what this means, men. Judged by the old standard of things, it is a huge undertaking, but in the light of recent achievements it seems perhaps quite ordinary. It will be done in four days, and no one will marvel.

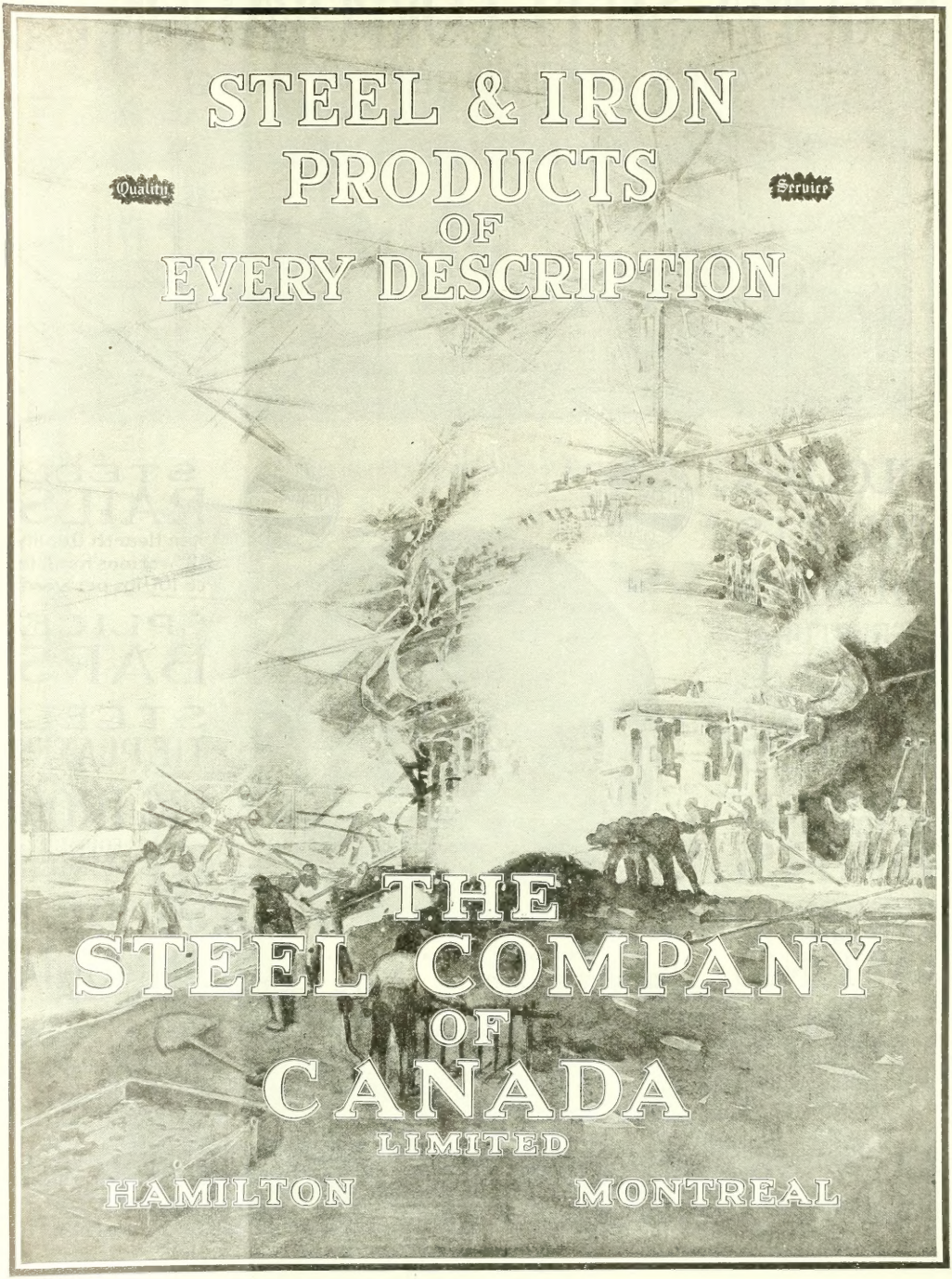
And yet it is a big thing to put across. A very big thing. Some of the best brains in the city have been working for weeks planning and organizing. Nothing has been left undone, nothing forgotten. The raising of $1,500,000 is a simple matter in itself but the perfecting of the necessary organization is a wonderful thing.

It is significant that the big men back of the campaign rely on advertising to help them. They appreciate the value of advertising and recognize its power, but they know that there must be organization back of it.

There is a lesson to be learned from the manner in which these big campaigns are conducted. They last but a few days and much has to be accomplished in a short space of time. There must be careful planning, wise leadership, complete organization, enthusiasm and *PUBLICITY*. All these things are necessary if a big success is to be won in a few days. How much more necessary is it, then, that there be careful, aggressive, enthusiastic organization back of the publicity of a commercial proposition which is being established, not by whirlwind methods in a few days, but by a slower process extending over a period of many years.

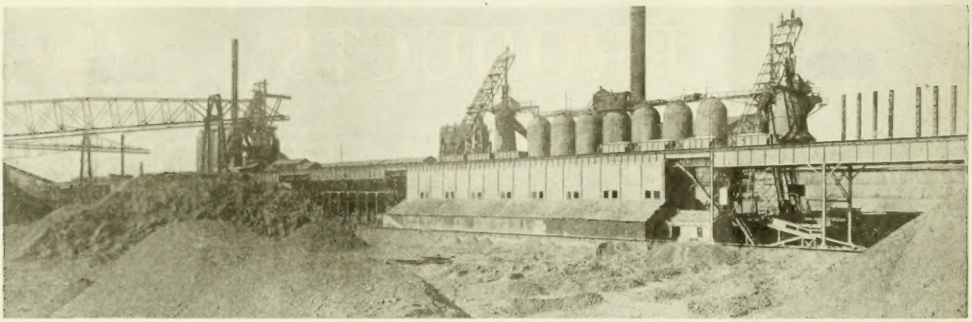
Some manufacturers lean too heavily upon their advertising, neglecting the supporting factors which make for success.

Canadian Machinery and Manufacturing News, May 8th, 1919. Vol. 21, No. 19. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Deparment, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.


STEEL & IRON
PRODUCTS
OF
EVERY DESCRIPTION
Quality
Service
THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON
MONTREAL

ALGOMA STEEL CORPORATION, LTD.

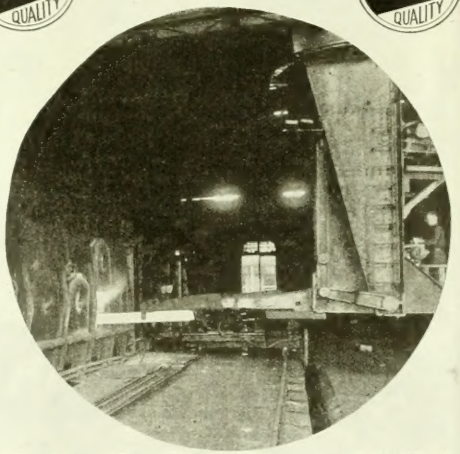
SAULT STE. MARIE, ONTARIO



BLOOMS,
BILLETS,
SLABS,
STRUCTURAL
STEEL
MERCHANT
BARS
CONCRETE
REINFORCING
BARS
IRON, BRASS
AND BRONZE
CASTINGS

MARK OF ALGOMA OH QUALITY

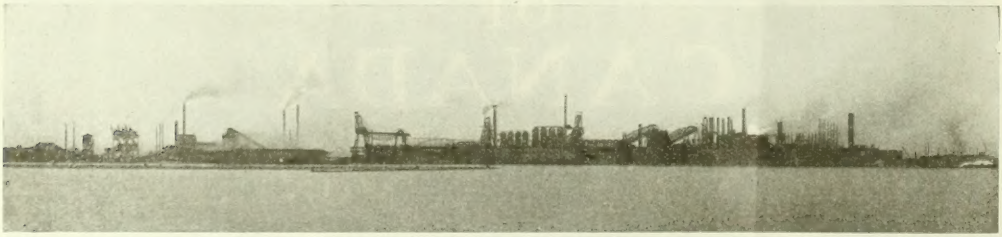
MARK OF ALGOMA OH QUALITY



Charging and Withdrawing Crane

Sulphuric Acid. Nitre Cake

STEEL
RAILS
Open Hearth Quality
(All Sections from 12 lbs
to 100 lbs per yard)
SPLICE
BARS
STEEL
TIE PLATES
PIG IRON
BASIC, FOUNDRY-
BESSEMER
SULPHATE OF
AMMONIA



GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

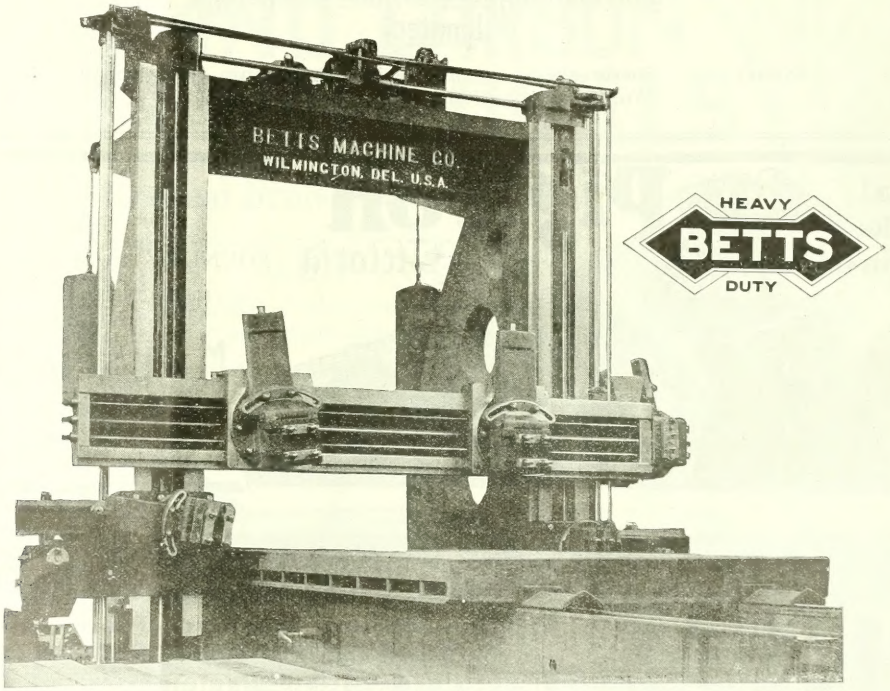
BETTS

Betts Leadership in Heavy Duty Machine Tools

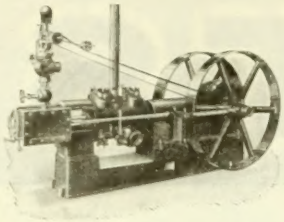
In every commercial field there is a leader—a trail blazer—a pace setter. In the heavy duty machine tool field, Betts has earned the leadership. For 58 years Betts' tools have set the pace and blazed the trail to greater production and machine tool efficiency.

The number of tools in operation in the world's largest locomotive works, railroad shops, steel mills, shipyards, forge shops, electrical shops, etc., is convincing evidence of Betts' leadership in the heavy duty machine tool field.

Let us tell you more about Betts tools.



BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON. DEL.



A Word About Your Coal Bill

Why not use your existing boiler capacity?

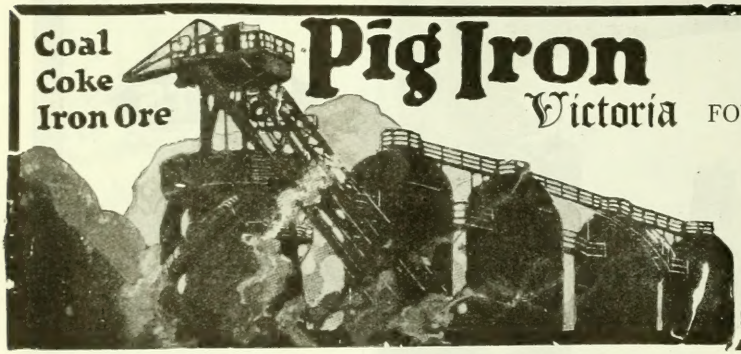
The steam-driven compressor illustrated is compact; you can easily put it into a corner of your power-house. Steam and air ends are built to the latest designs; the steam consumption is low, the efficiency high. The construction is such that supervision is reduced to a minimum—and there is a size to suit your plant.

K-302 is the bulletin

Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

Coal
Coke
Iron Ore



Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents, CLEVELAND

Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel

Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager

WILT

"Where there's a WILT—there's the Way"

HIGH SPEED AND CARBON TWIST DRILLS

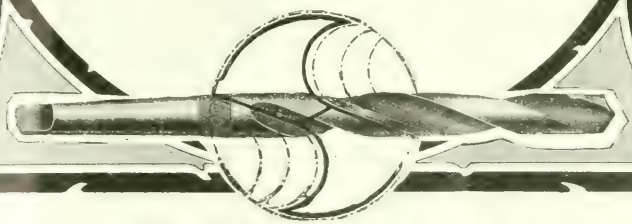
Unusual Drills Backed by Unusual Policies

Every superintendent should investigate the unusual qualities of

WILT TWIST DRILLS

The "WILT" has stood the test of all conditions—it is here to stay—its popularity among the mechanics makes that a certainty.

Investigate "WILT DRILLS" and you'll buy no others



WILT TWIST DRILL CO.
OF CANADA LIMITED

WALKERVILLE ∴ ∴ ∴ ∴ ONTARIO

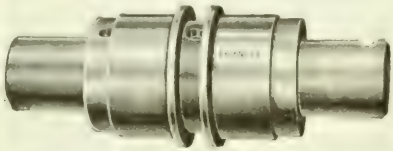
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E. C. 2, England

THE JOHNSON FRICTION CLUTCH

In the "Snyder" and a Host of Other Drill Presses

We feel justified in saying that Johnson Friction Clutches are in use wherever efficient drilling machines are manufactured.

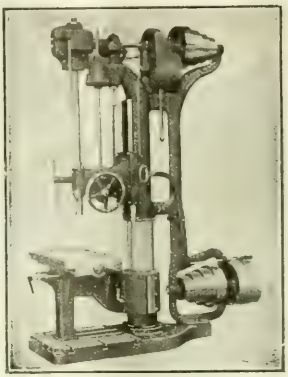
Every day sees new names added to our long list of machines which have Johnson Friction Clutches in their design. This wouldn't be so if there wasn't something a little better than ordinary about Johnson Friction Clutches. A simple request for information about your own proposition will bring surprising details and prices.



Double Clutch Enterprise

Write us for our Yellow Data Sheets

HERE



Courtesy of J. E. Snyder & Son, Worcester, Mass.

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THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Swedish Steel & Importing Co., Limited

Montreal New York Toronto Denver

Direct representatives of foremost Swedish mills: makers of

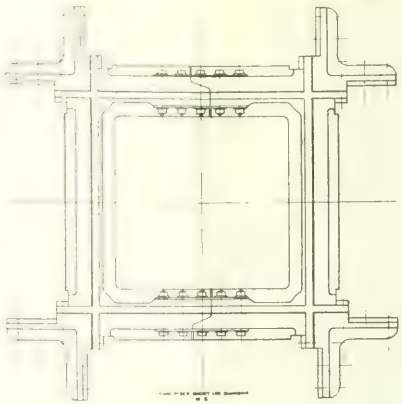
Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

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PROMPT SHIPMENTS from large stock





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COMPLETE INTERSECTIONS

Built-up, Hard-Centre or Solid Manganese-Steel Construction

Manufacturers of Balkwill Articulated Cast Manganese Crossings.

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Transportation Building. Montreal

Electrite

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE
ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

Uranium

Forging Billets and Bars

Electric Furnace, Alloy Steels

Die Blocks

Annealed—Heat Treated

Piston Rods

Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company

Milwaukee, Wisconsin

DETROIT—823 Dime Bank Building

FORD-SMITH

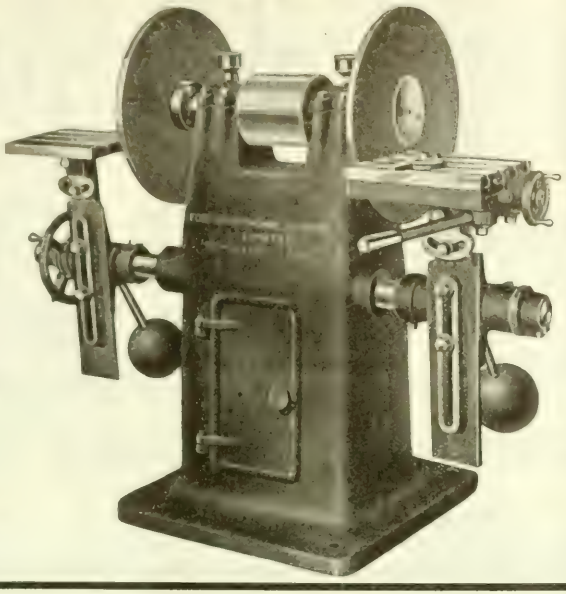
Disc Grinders—
Plain and Swinging Table

Wet-Tool Grinders

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Swing Grinders

Floor Grinders



Milling Machinery

Special Machinery

Manufactured by

FORD-SMITH MACHINE CO.
LIMITED
HAMILTON, CANADA

Our new catalogue is ready

Foreign Agents: W. E. Storey 3 Arundel St., London, Eng. Alf. Herbert, Ltd., 54 Dey St., New York.

IMPERIAL GENUINE BABBITT METAL

The High Grade Manufactured



Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

HOYT METALS

"Frost King"
"Trojan"
"Nickle Genuine"
BABBITTS

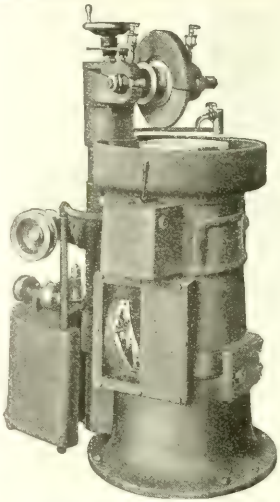
Put them to the test and you'll soon see a difference in your babbitt cost

relation to each other that the best possible alloy is

Annual sales over $5,000,000.

Hoyt Metal Co., Toronto
New York, N.Y. London, Eng. St. Louis, Mo.





BRISTOOL

Bristol 12-inch Rotary Precision Surface Grinder

Built for rapid production on grinding work.

It handles work either singly or in multiples within the capacity of the chuck and not thicker than 6-in., and grinds within quarter thousand in. of manufacturing accuracy.

And it is built to last.

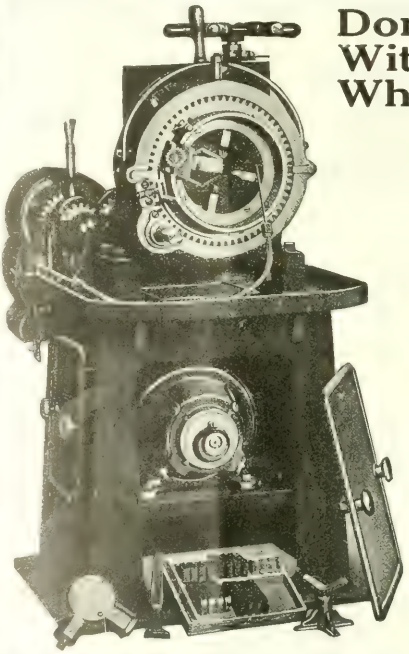
It is provided with exceptionally long bearings throughout, especially in the back column. This prevents the wear, which is very slight, from affecting the accuracy of the grinder. The Back Column is made to swivel four degrees, which allows concave or convex grinding.

Bristol Rotary Surface Grinders are made in several types and sizes and are regularly equipped with 8-in., 12-in., and 16-in. magnetic chucks, either belt or motor driven and for dry or wet grinding.

Our Bulletin describes the many good points fully. Send us your name and address and we'll gladly mail you one.

Grinds within .0004 in. of absolute Accuracy

BRISTOL MACHINE TOOL CO.
SUCCESSORS TO C. G. GARRIGUS MACH. CO.
BRISTOL, CONN.



Don't Talk Man Shortage With Six Men on Pipe Work Where There Should be One

Don't let urgent work lag for the want of men while you employ a gang of men instead of one man and a

Forbes Pipe Cutting and Threading Machine

on your pipe work.

The old-style stock and die method of cutting off 15-in. pipe required six men. It can now be done with one man and a Forbes Machine.

The motor-driven type follows the pipe-fitting work wherever an electric wire can be run. No hauling of heavy pipe to and from a stationary machine.

In the Forbes Machine the dies revolve. The pipe remains fixed in the self-centering vise. And the threads cut! They're the kind that make tight joints, because they're clean, accurate.

Write to-day for our catalog.

The Curtis & Curtis Co.
115 Garden Street **Bridgeport, Conn**

THERE is as much difference in the various makes of High Speed Steel as there is in men—

The practice and methods of manufacturers differ widely in every mill and anyone who is at all familiar with the manufacture of High Speed Steel thoroughly understands this

"Red Cut Superior"

The Nationally known—First Quality

HIGH SPEED STEEL

is the best for all Machine Work

ARE YOUR TOOLS MADE OF "Red Cut"?

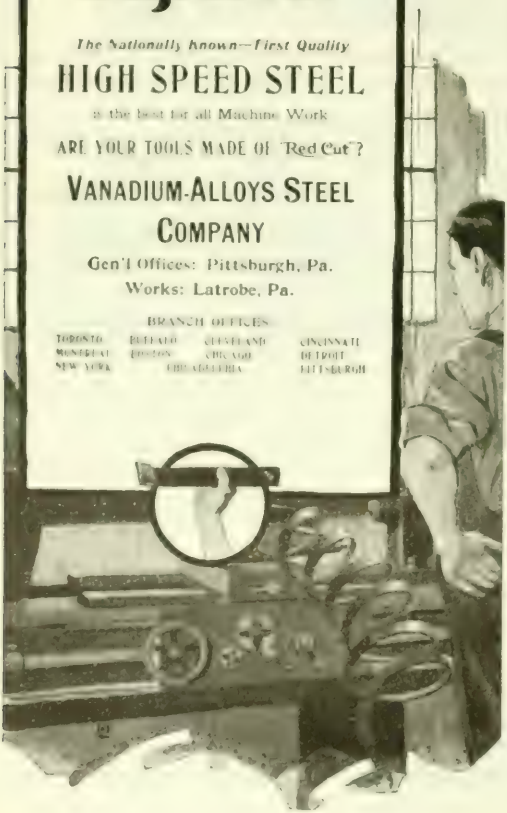
VANADIUM-ALLOYS STEEL COMPANY

Gen'l Offices: Pittsburgh, Pa.

Works: Latrobe, Pa.

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MONTREAL BOSTON CHICAGO DETROIT
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ELECTRIC

Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND ONTARIO



Forgings, Stampings or Pressed Steel Parts

An attractive catalogue showing the facilities this company has for producing Forgings, Stampings and Pressed Steel Parts—particularly in large quantities—sent on request.

Dominion Forge & Stamping Co., Ltd.

WALKERVILLE, ONTARIO

Toronto Office: 510 Lumsden Building

CANADA
FOUNDRIES & FORGINGS
LIMITED

A SOLEMN WARNING

A flood of business will overwhelm this country inside of two months. Problems of supply must be met and faced squarely. Those firms who have courage are getting their supplies now. Those who are hesitating are going to receive an awful jolt when they finally decide to proceed with business, because it will be impossible to get service. They will then blame everybody but themselves. Our solemn warning is, "Don't blame us because you didn't see this vision."

Canada Foundries & Forgings, Limited
WELLAND, ONT.

LOCOMOTIVE AND CAR WHEEL TYRES

HIGH-SPEED AND CARBON
TOOL STEEL

MISCELLANEOUS SHOP TOOLS

MADE IN CANADA

ARMSTRONG WHITWORTH
OF CANADA, LIMITED

Head Office:
298-300 St. James Street,
Montreal.

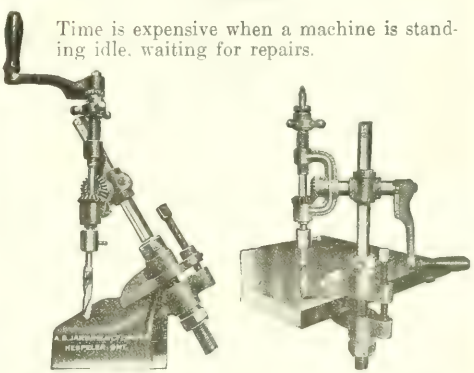
Works:
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McArthur Building WINNIPEG

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Offices:
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Steel Ingots
by the
HARMET
Liquid Process

GENUINE EMERY

Sizes 180, 160, 140, 120, 110, 100, 90, 80, 70, 60, 54, 46 40, 36, 30, 24, 20, 18, 16, 14, 12, 10, 9, 8, hole.

EMERY FLOUR AND WASHED FLOUR

EMERY GLASS FLINT GARNET CORUNDUM CARBORUNDUM	PAPER AND CLOTH	IN SHEETS, ROLLS, DISCS, BANDS, STRIPS and TAPES, &c.

John Oakey & Sons

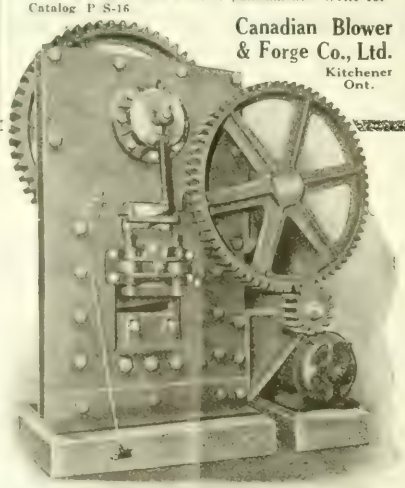
LIMITED
WELLINGTON MILLS
LONDON, S.E. 1., ENGLAND

CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

That means a lighter and stronger machine—a machine built to take a lot of punishment. **Write for Catalog P S-16**

Canadian Blower & Forge Co., Ltd.
Kitchener Ont.





He knows "W & B" Twist Drill and Reamer Quality

Trade Mark

"W & B" Cuts Hole Cost

DRILL-CHEAPNESS means hole-expense. The Drill isn't the only thing. There's labor, and time. Poor Drills make few holes, have to be sharpened often or break easily. Every delay means expense—increased overhead, lost production, more Twist Drills.

Cheap holes lead to profits and progress, and the best Drills and Reamers make the cheapest holes. The employer gets more production and the drill press operator gets more pay.

Whitman & Barnes is a sixty-five year old corporation. "W & B" Drills and Reamers have helped to build the Panama Canal, the Grand Central Station, the New York Elevated Railroads, Ships, Trucks, Tractors, Bridges, Engines, Farm Machinery, Automobiles, Locomotives, Steel Cars and all kinds of manufactured products, everywhere.

For a lifetime "W & B" Drills and Reamers have been unsurpassed in hole-making quickness, accuracy and economy. The careful, intelligent, thrifty shops know "W & B" tools by performance. From the small manufacturer to the United States Government, the demand for "W & B" Drills and Reamers has filled our factories with high-grade orders.

"W & B" means experience, research, achievement, capacity, fair dealing, promptness, technical accuracy and reasonable prices. Use our experience and reputation by specifying "W & B" Carbon or High Speed Twist Drills and Reamers. Right for all industries.

The Whitman & Barnes Manufacturing Co.,
Office and Factory: St. Catharines, Ont.
London Office: 139 Queen Victoria St., E.C

Established 65 Years

Whitman & Barnes

TWIST DRILLS — REAMERS — WRENCHES — HAMMERS



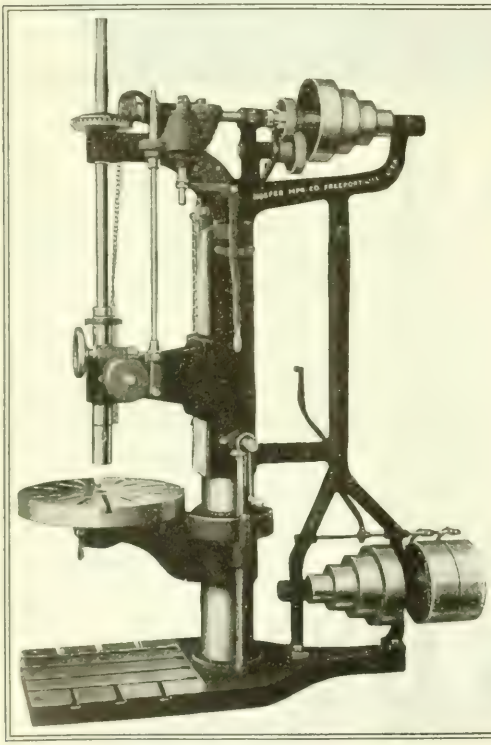
"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.



HŒFER

for

PRECISION DRILLING

For over 25 years the name Hoefer has been associated with drilling equipment. Drillers have been our specialty.

Hence it is only natural that Hoefer Drillers should embody the latest word in design, efficiency and accuracy.

And they do. Regardless of the size of press, drilling to a fine degree of precision is always possible.

Hoefer Drillers are looked upon as a recognized standard—the standard by which satisfactory service can be measured.

Catalog showing complete line on request.

HOEFER MFG. CO.
FREEPORT - ILL.

DRILLERS

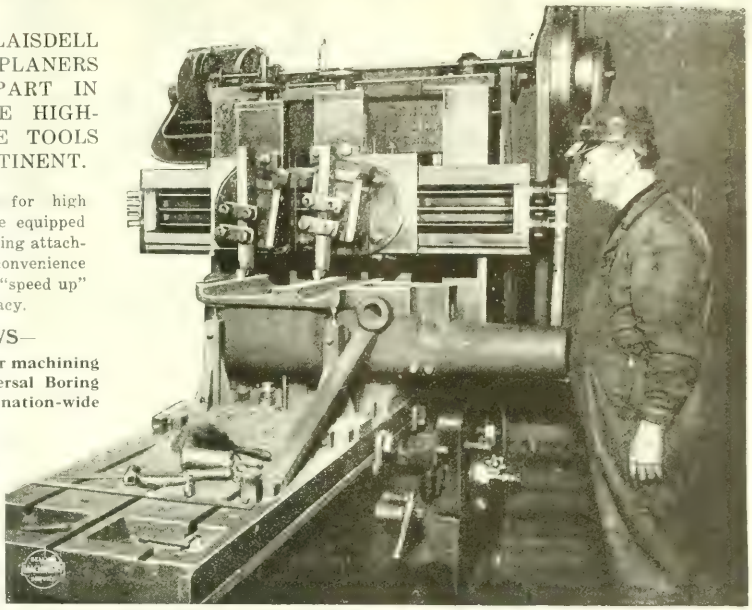
Whitcomb-Blaisdell Planers

WHITCOMB-BLAISDELL LATHES AND PLANERS PLAY SOME PART IN THE MOST OF THE HIGH-GRADE MACHINE TOOLS MADE ON THE CONTINENT.

ALL-round machines for high grade work, they are equipped with special labor-saving attachments that add to their convenience and enable the operator to "speed up" without endangering accuracy.

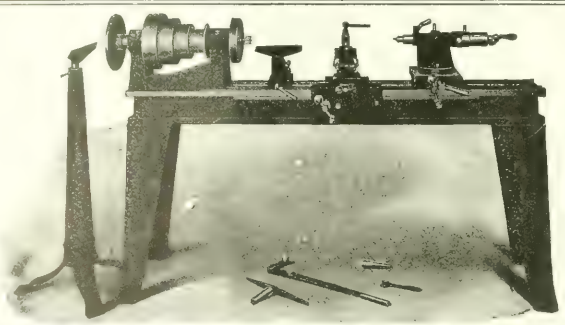
ILLUSTRATION SHOWS—

a Whitcomb-Blaisdell Planer machining the head post of a Universal Boring Machine—a machine with a nation-wide reputation for accuracy.



May we send you our catalogue giving full particulars?

Whitcomb-Blaisdell Machine Tool Co.,
WORCESTER, MASS.
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A Favorite—

Blount Pattern-makers' Lathe

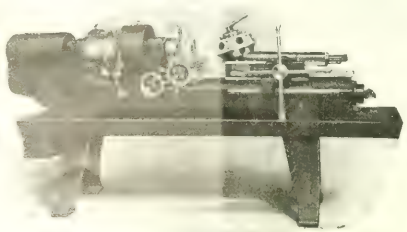
FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

Our catolog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

J. G. BLOUNT COMPANY
EVERETT, MASS., U.S.A.

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



INVESTIGATE!

SEND FOR
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WOOD TURRET MACHINE CO
BRAZIL INDIANA U.S.A.

POTTER & JOHNSTON

AUTOMATIC MILLING MACHINES

HORIZONTAL VERTICAL

EVERY working part of this machine is built with a view to **increased production.**

CONTINUOUS MILLING

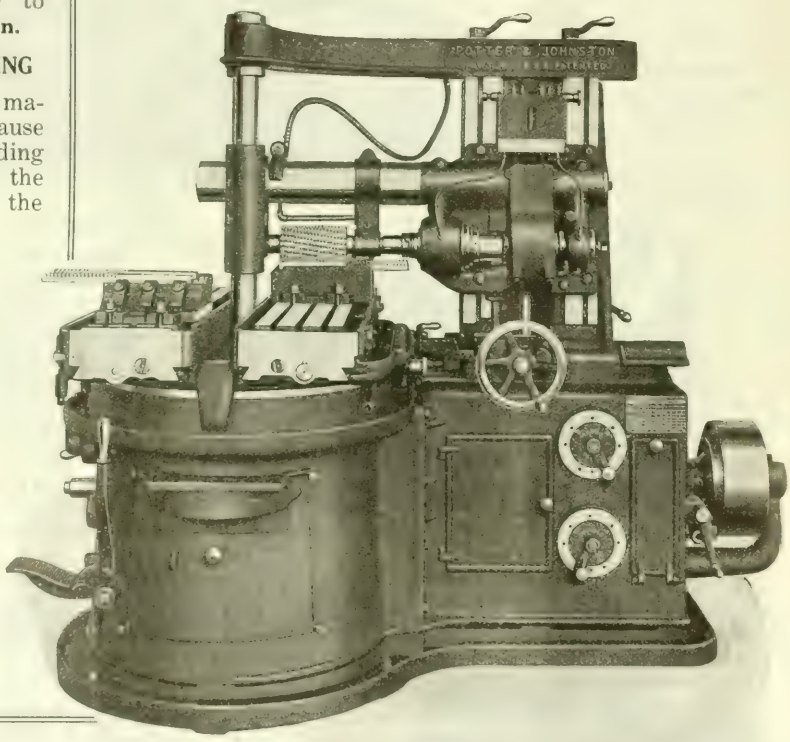
No lost time due to machine idleness because the operator is loading one fixture while the cutter operates on the other.

16 Table Feeds, 7/8 in. to 12 5-16 in.

Length of Table Feed, 28 inches. 12 Spindle Feeds, 20 to 180 R.P.M.

Send us your Blueprints and we'll gladly give you production figures.

Bulletin 36 on application.



Canadian Offices: POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse: Galt, Ont., Canada

A WALL RADIAL DRILL

That Puts Dollars In Your Pockets

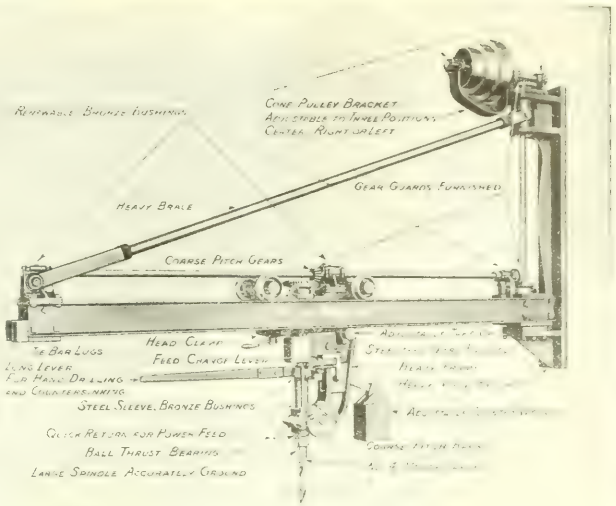
Here's a real machine tool in the wall radial drilling line for your consideration. Listen to this—the machine is made of high grade materials throughout and the workmanship is beyond criticism. It is designed with the particular idea of maximum production, at a minimum operating expense. Entire control within easy reach makes the operators "boosters" for these machines. You can keep the dollars that may be slipping away on your wall radial drilling proposition in your pocket, by the installation of this machine.

Send for detailed bulletin.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



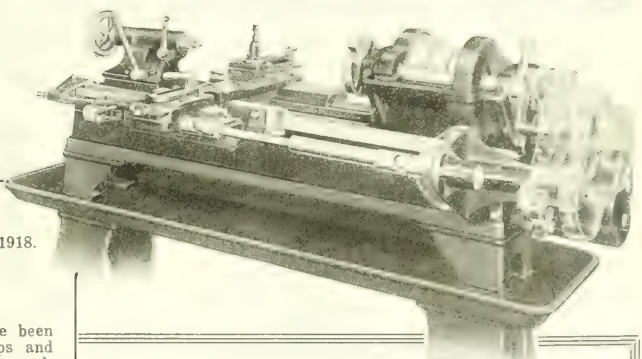
LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS**

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th. 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. **Send for the full details of this ideal precision tool.**

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

LANDIS

Plain
Self-contained
Grinding
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You Can't Afford to Overlook These LANDIS Features

Work Table Stationary. The Landis principle of having the work table stationary secures it firmly on the bed.

Overhang Eliminated. The Landis Grinding Wheel Head, in its travel, never goes beyond the length of the bed. The Landis Grinding Wheel Head is directly above the carriage and supported between the wide, well set apart, carriage ways.

Downward Belt Pull. The wide, powerful, endless grinding wheel belt pulls directly back and down from the wheel spindle, tending to secure the base with the bed.

Our catalog gives complete data and specifications of various types of Landis Grinding Machines.

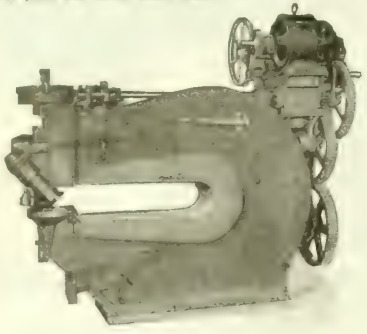
LANDIS TOOL CO., WAYNESBORO, PENN.
50 Church Street, New York City

H. COLLIER SMITH
"QUICKWORK"
Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut A" pieces of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

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THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

The

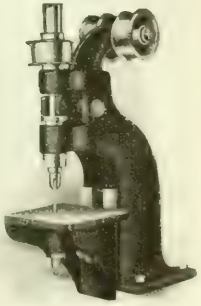
GRANT

Spins a Polished Rivet Head Every Second Without Noise

A dozen of these GRANT ROTARY RIVET SPINNING MACHINES going at full speed would not awake a light sleeper in the same room.

The GRANT is fast. In one second it will quietly spin a polished rivet head without breaking or in any way marring the casting. It will rivet tight or loose, as required. The GRANT boosts the output, cuts the cost, and turns out perfectly accurate work.

Pleased to tell you more about it. Write.



Grant Noiseless Rotary Rivet Spinning Machine

The Grant Mfg. & Machine Co.
Holland Ave., Bridgeport, Conn.

Tycos
TEMPERATURE INSTRUMENTS

Indicating · Recording · Controlling

This General Trade Mark REGD. TRADE MARK Tycos ROCHESTER, N.Y.

covers all indicating, recording and controlling instruments made by this company and is a synonym for standard apparatus—precision, reliability and permanence.

We invite, from all interested industrial managers, correspondence relating to our instruments and their uses.

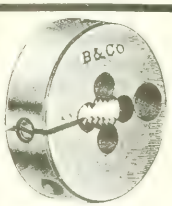
Our stock models cover every usual industrial requirement, with very moderate outlay.

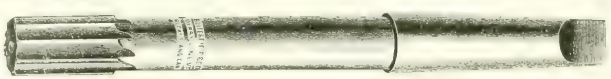
Taylor Instrument Companies

Rochester, N. Y.

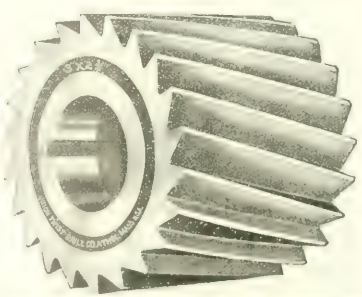
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Taps, Dies, Reamers, Drills, Milling Cutters

Butterfield quality gives the Maximum returns on your investment.

BECAUSE

It ensures **clean and accurate cuts** and will duplicate the work over a long period of use.

Butterfield Quality is the result of 35 years' continuous effort to keep our product distinctly in the lead from the standpoint of efficiency and economy.

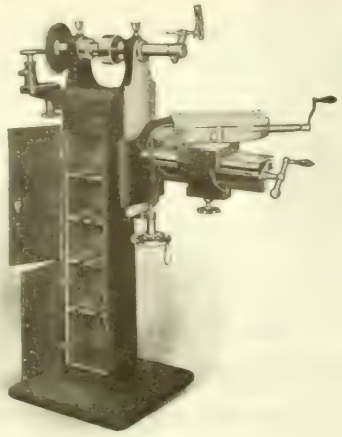
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Butterfield & Co.
Inc., Rock Island, P.Q.

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GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

From Cutters and Tools Kept Sharp on

GARVIN No. 3 UNIVERSAL
CUTTER AND SURFACE GRINDERS

Simple **Light Running** **Accurate**

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9½" x 6"

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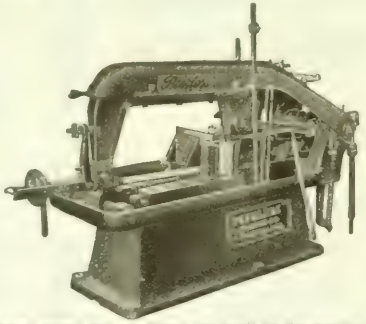
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Spring and Varick Streets *(Visitors Welcome)* 50 Years New York City

Peerless HIGH SPEED

The New Standard of Production

Why Not Cut Off Stock From 50 to 100% Faster?



Is there any reason why you should not profit by the superior speed, economy and capacity of the Peerless, as well as others? Why not do more work with the same number of machines, or the same work with fewer machines? Why you, also, should not save in room, in operating expense and in costly material?

We will prove to you what the Peerless is doing in some of the largest plants in the country, or will let you prove its superiority in your own plant. A machine is ready for you to try, and if after 30 days' use you want to let it go, you may ship it back at our cost for freight both ways.

Write us about it—now.

PEERLESS MACHINE CO.

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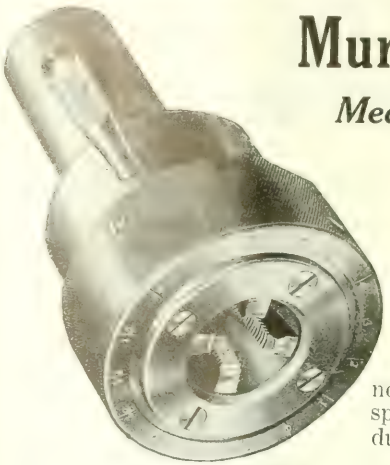
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are dependable springs

We've been making springs since 1845. We've evidently made good. The demand for Dunbar Springs has forced us to put up a big new plant. With better equipment than ever before, we are ready to handle your orders. You might be interested in spiral or flat Vanadium Steel Springs—we've done some good work in this line. If there's anything in small springs or oil tempered Steel Springs of any sizes that you need, it might be well to get in touch with us.

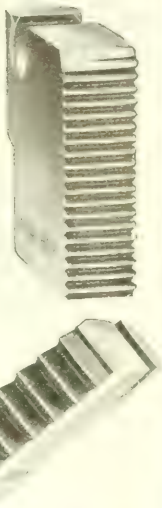


The Dunbar Brothers Co. BRISTOL CONN.



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Mean Quick Deliveries



Murchey Tools will cut your tapping and threading costs. **They will boost production 50%.** Another important feature is Murchey's **Quick Deliveries on Chasers.** This is a Murchey specialty. No waiting! We get your chasers to you when you want them. Why not use Murchey Tools to speed up your threading production?

Send for a Murchey Tap or Die on approval and give it a trial. You will then secure actual proof of its value to you.

Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.

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For trimming, stamping forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

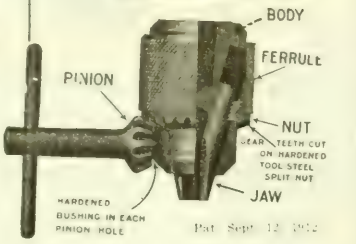
CONSOLIDATED POWER PRESSES

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9 and 12".



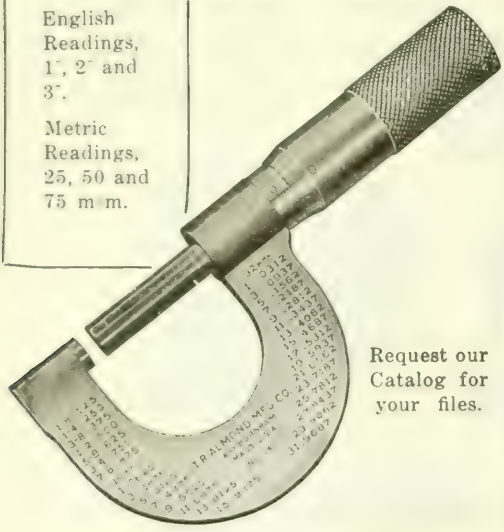
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



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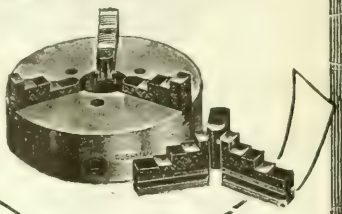
We've been Manufacturing

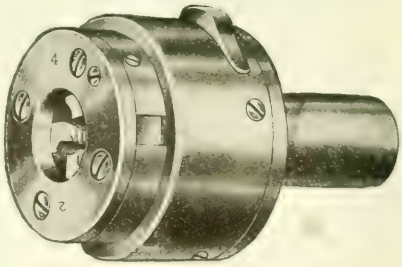
Nothing but Chucks and Their Accessories

FOR NEARLY 60 YEARS
AND OUR PRODUCTS SHOW IT

Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.
Cushman Chuck Co., Hartford, Conn., U.S.A.





H & G **Die Heads**

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.
New Haven, Conn., U.S.A.

B-T THREAD LEAD INDICATOR

Be Sure You're *Right*--Then Go Ahead

[illegible] right thread lead instantly, and maintaining a [illegible] check upon it, minimizes the possibilities of delays in [illegible] and reduces the number of parts scrapped through incorrect measurements.

B-T Thread Indicators detect errors of one thousandth of an inch from correct lead. They are easily read—absolutely accurate—and can be used for testing odd pitches, as well as external and internal threads.

BICKNELL-THOMAS CO.
GREENFIELD, MASS.



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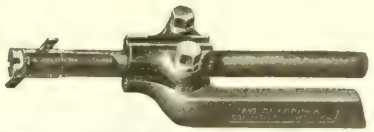


Made to work quickly, conveniently, safely and easily—closed and opened by a slight twist of the key—

Jacobs Chucks

hold tools firmly and precisely and save time and labor. Wherever durable, reliable chucks are demanded there Jacobs Chucks are found.

[illegible] MFG. CO. HARTFORD, CONN. U.S.A.



Williams' "Agrippa" Boring Tool takes any size or shape of bar, within its range, and requires no bushings. Its sleeve bar cap admits a straight or angular cutter; either can be quickly inserted at the business end of the bar without removing the cap or disturbing the setting of either the bar or the holder.

Williams' "Agrippa" Tool Holders

"THE HOLDERS THAT HOLD"

YOU wouldn't use the best automobile produced in the *Nineteenth* Century if you could get it for nothing. You wisely prefer to buy a modern car because of its cheaper maintenance, improved performance and increased convenience.

In the shop you can obtain these same advantages through the *Twentieth* Century improvements of Williams' "Agrippa" Tool Holders.

Remember, too, that while improved roads have made automobile performance easier, tougher steel, heavier machines and higher speeds have rendered tool holder accomplishment more difficult.

Machinists' Tools Booklet on request

J. H. Williams & Co.

"The Drop-Forging People"

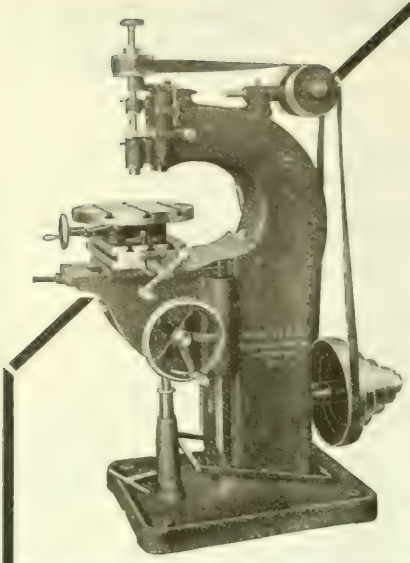
45 Richards Street Brooklyn, N.Y.

The A. G. Low Co., Ltd.,
45 Pacific Ave., Saskatoon, Sask.

Agents for Manitoba, Saskatchewan, British Columbia and Alberta

Williams' "Agrippa" Planing Tool has a serrated ring of improved steel which affords unequaled variety and rapidity of adjustment. The ring is correctly hardened to resist the wear of the cutter. The body of the holder receives a very different heat treatment that prevents break-age.





BECKER
BELT DRIVEN
MILLERS

Designed expressly for light, general shop use, the Becker Belt Driven Miller shown here fills a recognized need.

Its strength, as characterized by the solidly built stand, heavy "gooseneck" and the massive knee, is apparent.

Your next machine should be a Becker Belt Driven Miller—circular O-502 tells why.

Write to-day—now.

Becker Milling Machine Co.
HYDE PARK, BOSTON, MASS.

Canadian Agents:
Rudel-Belnap Machinery Company, Ltd., 137 McGill St., Montreal.
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MORROW SCREWS MORROW

DRILLS FILES

MORROW NUTS MORROW

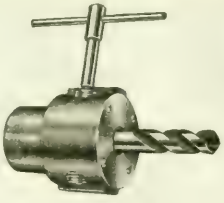
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Cap Screws
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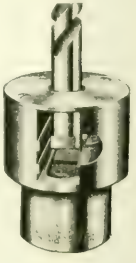
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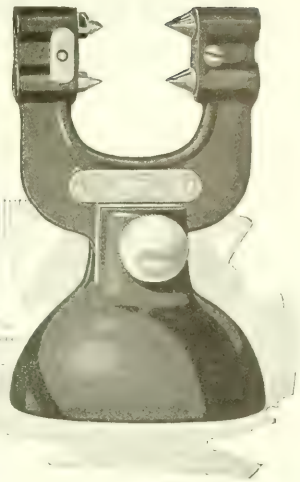


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Makers of a complete line of chucks





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Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 44A

Semi-Precision Grinding

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Norton wheels grain 14 and 16, grades O and P are very successfully used on these semi-precision operations. Local conditions, such as speed of wheels, finish desired (although this is not usually important) and condition of castings all affect the choice of wheels and may make necessary a slight change from these grains and grades.

Constant touch with work of this nature has given us experience that will be of help to anyone having problems of this nature.

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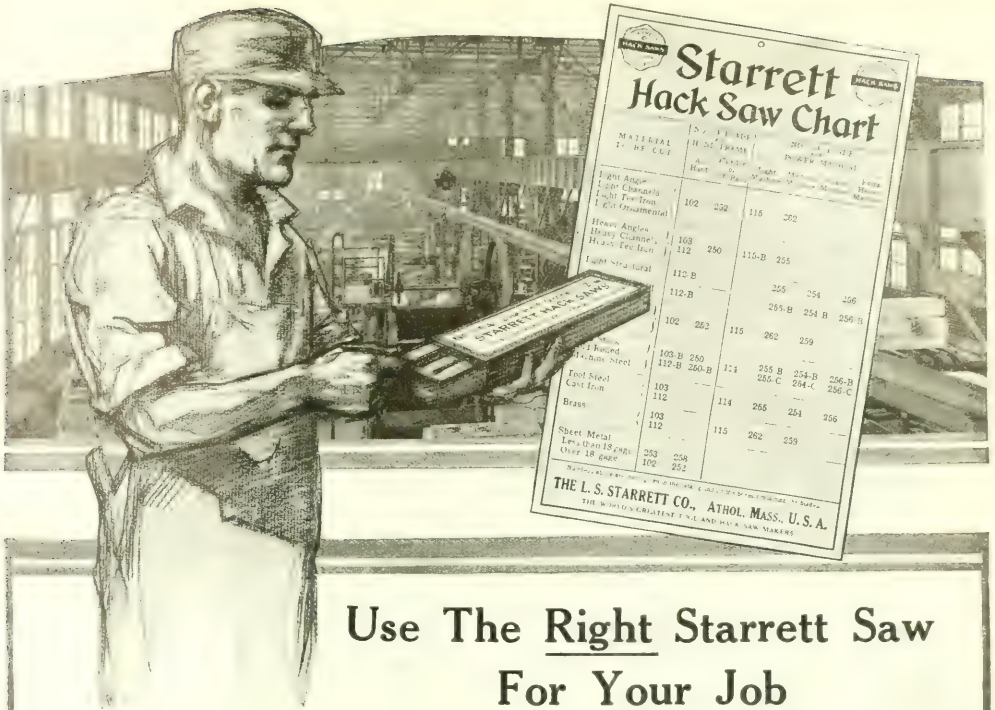
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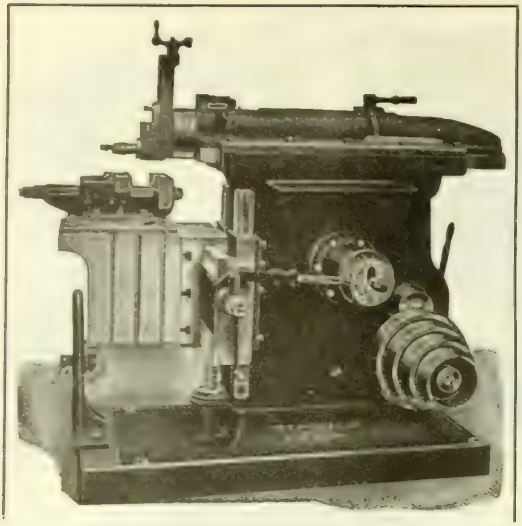
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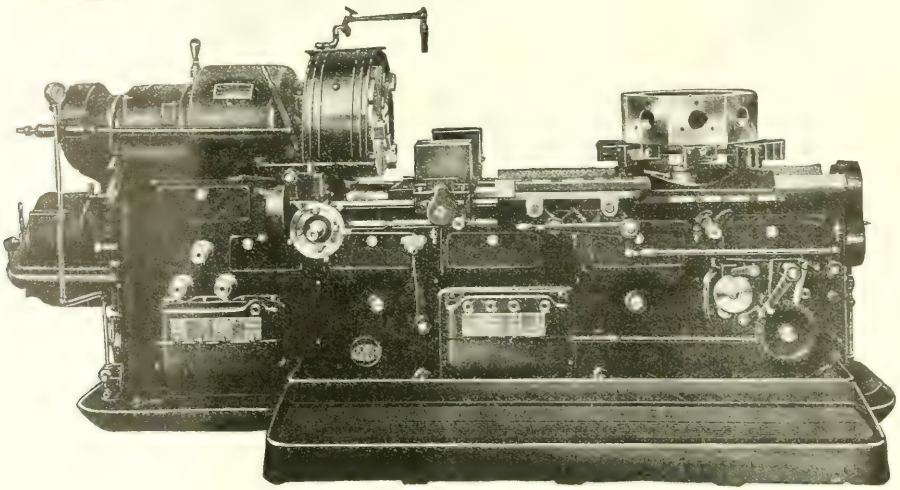
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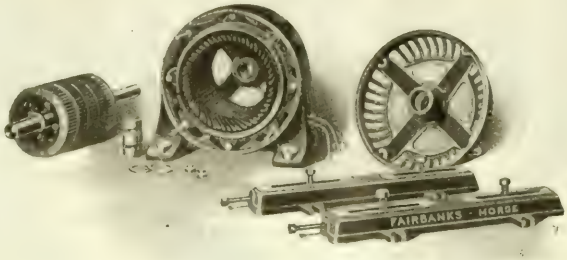
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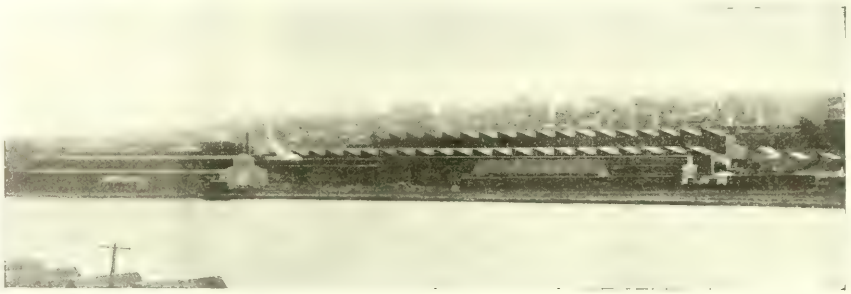
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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI No. 19 May 8, 1919

Home of The Canadian Ingersoll-Rand Co.



Dealing With the History of This Plant, Together With its Various Departments, Including the Productive and Apprenticeship Systems Employed

THE Canadian Ingersoll-Rand Company, Limited, is the descendent of the Canadian Rand Drill Company, which started in Sherbrooke in 1890 with a total staff of some twenty men, using small rented premises. The expansion was rapid, and after one move had been made, the company finally moved to its present site in the upper town, and built its own plant.

Site and Layout

The present site of the plant is on slightly sloping ground, separated from the Magog River by the station and yards of the Canadian Pacific Railway, from which five parallel sidings enter the yards and buildings. Iron, coke, and heavy foundry supplies are received in the upper yard at the cupola level, and the finished product is shipped from the lower levels. Sherbrooke has the advantage of being served by four railways, being on the main line of the Canadian Pacific Railway from Montreal to St. John, the Montreal-Portland main line of the Grand Trunk, in addition to being the northern terminus of the Boston and Maine, and the headquarters of the Quebec Central Railway. Interswitching facilities are good, and [illegible] between the company and the railways make possible much more prompt railway service than can be obtained in large centres. Electric power is cheap and abundant, there being both the city supply from hydro-electric stations on the Magog and St. Francis Rivers, and also Shawinigan power; all of these are connected to the power station of the Canadian Ingersoll-Rand Company.

Pattern Shop and Pattern Storage

The pattern shop of any plant is in close connection with the foundry, and in the case of the plant of the Canadian Ingersoll-Rand Company the pattern shop is placed between the foundry and main office, so that it is easy of access both to the engineering department and foundry foreman. The building itself is of brick construction, single-storey, well lighted all round, the natural lighting being helped by the fact that none of the neighboring buildings are close enough to obstruct the windows. The equipment is complete, including swing cut-off saw, bandsaw, rip saw, buzz planer, sanders, emery disc, cylinder sanders, wood-turning lathes, etc. A special feature of the layout is that the benches are arranged crosswise to the windows: this arrangement has advantages both for lighting and for general convenience. Iron tables, with surface planed flat and edges straight and square, are in use for lay-out work, and have proved of very great value.

There are four pattern storage buildings. All patterns are stored on shelves, and are easily located by means of a simple numbering system. Both patterns and shelves are numbered.

Foundry

As explained above, the sloping character of the site of the plant has been used to advantage in the placing of the buildings. Thus the foundry is on the higher level, and all materials used in the cupola are received in the upper foundry yard on the cupola level, so that no hoisting of materials is necessary. Sand for cores and moulds is mixed on an upper floor, and supplied to the core department and moulding floor by means of chutes. The upper floor extends the whole length of the building, and is used for storage of all kinds of lighter foundry supplies and equipment.

The foundry has two cupolas, and is equipped with a Mumford jolt ramming machine, which, when installed, was the largest in Canada. The equipment of special flasks is particularly thorough, which permits of making all moulds for regular lines on a manufacturing basis.



FOUNDRY

There are also smaller jolt ramming machines for core work; Tabor roll-over machine for side floor work, and a full equipment of pneumatic sand-rammers.

Two ovens for baking dry sand moulds and core work are a special feature, there being three large ovens, twenty-five feet square, and two small ovens. The foundry is served by two cranes of fifteen and ten tons capacity, and there are also jib cranes with pneumatic motor hoists in the bays, and in the cleaning department. The sand-blast room is one of the best equipped in the country, using a combination of Pangborn, Sly, and Ingersoll-Rand systems. In addition to the sand-blast equipment, the cleaning department makes use of pneumatic chippers and grinders.

Foundry Yard

Between the foundry and the compressor shop lies the foundry yard, in which are stored flasks and castings. The principal feature of this yard is that it is spanned by a 10-ton traveling crane, which is, of course, very much more convenient than a series of jib cranes.

Compressor Shop

"No. 2" building is not likely to be a favorite with the Germans, as from under this roof came the largest production in Canada of 8-in. shells, the second largest of 18 pr. shrapnel, in addition to thousands of 6-in. and 75 m.m. shells. Following the armistice the shell machines have been cleared out and stored, and the compressor department has been moved up from the original building on the company's present site. [illegible] is now used as a finished products warehouse.

The building is of one-storey construction, with basement extending under the northern half, the latter used as a general store room. The type of construction is of the heaviest, to support 250 lbs. to the square foot. With a view to supplying an abundance of light the roof is of the "saw-tooth monitor" type, the clear height under the monitor being 40 ft. with 25 ft. clear height under the side bays. The side windows are of the modern wide type, so that there is no lack of daylight in all parts of the shop.

The Canadian Ingersoll-Rand Company manufactures two main types of air compressor, the straight-line and the duplex, both in several classes and sizes. With the increased facilities for cheap electric power the demand for power driven compressor is steadily increasing, and with the short-belt drive supplied for small and medium sized compressors, and direct motor drive for the larger machines, electric drive is as compact as steam drive and usually more economical. The shop is arranged with the machine-tool section under one side bay, the tool-room under the other side bay, leaving the centre for erection, testing, and shipment. The layout of the machine tools is arranged with a view to having a continuous flow of material. Castings are brought in by a truck on rails, either from the foundry yard, which lies between the compressor shop and foundry, or direct from the foundry. Machine tools are served with pneumatic motor hoists, either on jib cranes or runways, and the material is thus passed from machine to machine and handled on the machines with next to no manual labor. The centre of the shop is served by a ten-ton traveling crane.

The equipment of the shop resembles that of an engine building plant; vertical and horizontal boring mills, lathes, drill presses, and milling machines. Compressed air is used to a large extent; pneumatic drills in erection work, chippers and grinding for finishing up frames, flywheels, etc., compressed air jets for cleaning out deep holes in drill-press work.

An important feature of the work is testing; all compressors are tested before shipment; the illustration shows a "PLB-2" compressor under test.

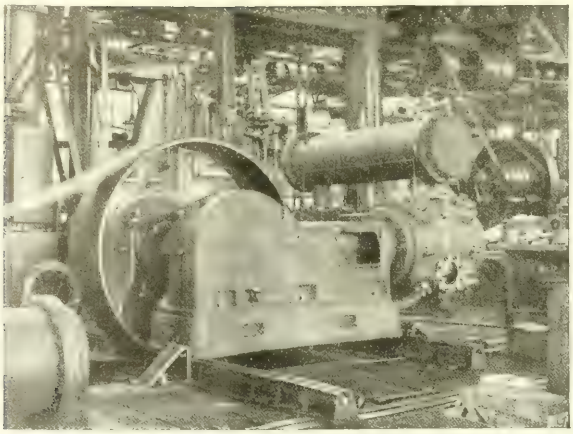
Drill Shop

Among the principal products of the Canadian Ingersoll-Rand Company are rock drills. These are manufactured in "No. 3" building, situated between the compressor department and the northern boundary of the plant. This building was extended 200 feet in 1917, and at the time of the extension advantage of the change was taken to remodel the grouping of the machine tools and to instal a central circulating system for cooling compound. The shop is equipped with sprinkler system, as are all the other buildings of the company, and heated by hot water. The lighting in general use throughout the plant is by 200 watt Mazdas, supplemented where necessary by low-power drop lights at the machines.

The modern rock-drill is subjected to very hard usage, has a very high drilling speed, and is expected to have good wearing qualities. All of these require-



GROUP OF COMPRESSORS BEING ERECTED.



COMPRESSOR ON TEST FLOOR.

ments demand great care in manufacture, with rigid inspection. The equipment of the drill shop is therefore absolutely up-to-date; the lathe department includes besides engine lathes, Gisholt turret lathes, Jones and Lamson turret lathes, in addition to Potter and Johnston, and Cleveland automatics. Among the special equipment of the shop may be mentioned a Pratt and Whitney splince miller, and five automatic threading machines, which are found of great value in the accurate threading necessary on feed screws and feed nuts. The heavier lathes and drill-presses are all served by direct-lift hoists; the power consumption of these hoists is in the neighborhood of ten cents a day, and they are found of great service in lifting the heavier castings, etc.

Drill Testing Department

All rock drills are tested before leaving the plant; the photograph shows one of the drills just about to start work drilling the test block of granite. In the same department are two Leyner sharpeners and furnaces used for sharpening drill steel; these machines double the speed of the ordinary mine blacksmith; this particular installation is used to supply sharpened steel to customers and to the drill testing department.

Pneumatic Tool Department

The accuracy necessary in the manufacture of pneumatic tools is not realized by the general public; close fits are absolutely necessary and yet the tools must not be delicate, and must stand up to very severe service without frequent stoppage for adjustment and repairs. For these reasons the equipment in this department is among the most modern in the plant, and inspection is exceedingly rigid. The bulk of the work passing through the department is steel, which is used instead of cast iron on account of its much greater strength. The lathe work is done as far as possible on the automatics, or on the turret lathes, both of which are well adapted for high speed and accuracy. The main factor governing which type of machine is to be used is generally the size of the lot being manufactured, as, of course, the "set-upts" time is an important item of the cost when using the automatic lathe. Milling is handled by a group of modern milling machines corresponding in size to the No. 2 and No. 3 Cincinnati.

Finally comes the grinding. As the limits on parts for pneumatic tools are extremely close, the equipment of grinders is not only extensive, but thoroughly modern and kept in perfect condition. It can be understood that with manufacturing demands to limits of a thousandth, the matter of alignment of a grinder spindle is of some importance. The inspection department is furnished with a master set of Johannsen gauges, scleroscope, etc. A little point of interest is that all barrels and handles of the pneumatic tools are sand-blasted, smoother finish, but because the sand-blasting immediately shows up even the tiniest flaw in the forging, and is hence of great assistance to the inspector.

Apprenticeship System

One of the principal questions of the day is that of apprenticeship; it is significant to note that the Whitley reports, which have been adopted as the best solution of labor difficulties in England and are being studied on this side of the water, lay considerable stress on this point. The Canadian Ingersoll-Rand apprenticeship system has as its central idea the provision of future foremen. With increasing specialization, the old-time all-round machinist is being displaced by the specialist, but the machine-shop foreman must be more than a specialist, and an apprenticeship scheme for training future foremen must give an all-round training.

The first point in the Canadian Ingersoll-Rand scheme is that the boy must be sixteen years old and must have completed an ordinary public-school education. In order to make sure of the latter point, the application form now includes an elementary examination.

Apprenticeship is for four years, divided into eight periods, the apprentice being given an increase in pay at the end of each period. All apprentices are under one supervisor, whose business it is to see that the boys become familiar with all classes of work, lathe, milling-machine, fitting, etc. It has not been found practical to move the apprentices from one class of work to another at stated intervals, the ruling principle being that the apprentice must be really proficient before he is transferred.

In addition to the machine-shop instruction classes in elementary shop mathematics are given twice a week (in the company's time, at which attendance is compulsory. A provision in the



LEYNER OUTFIT SHARPENER



TESTING 7⅛" DRILL

agreement for apprentices reads as follows: "Apprentices will be allowed one day of their time on any period for each evening they attend a class of the Industrial Drawing Schools, or of any approved technical classes of the Y. M. C. A., or other approved institution."

The working conditions are similar to that of the ordinary machine operator; the apprentice can earn premium above his current day rate, and he can purchase tools from the company at cost. At the end of four years a bonus of $50.00 is given with a certificate of proficiency, and the boy is well on the road to become a foreman.

Forge Shop and Hardening Department

The Forge and Hardening Department ranks as one of the most important in the whole plant. Proper heat treatment will give almost any result required in the way of toughness, hardness, etc., and the majority of the parts that go to make up the rock hammer-drill, and pneumatic tool require quite a complex heat-treatment.

The Forge Shop proper is equipped with two steam hammers and fuel oil furnaces, forge fires, etc., but the bulk of the work of the department is in the hardening and heat treatment section. For this part of the work there are two large carbonizing furnaces, oil-treating furnace, hardening furnaces, lead and cyanide baths. Temperature is the chief factor in heat treatment, a matter of a few degrees around the "critical" points making a very great difference in the resulting steel. For this reason, the pyrometer equipment is usually complete, and to secure uniform results the pyrometer indicators are enclosed in insulating boxes having double walls packed with sawdust. All pyrometers are frequently compared with the master pyrometer and corrected when necessary.

Production System

More and more it is realized that whatever the faults of the modern systems of shop management, they are relentlessly pushing out the older "trial and error" methods. Scientific management has drawn bitter criticism, largely through being applied so often by theory-engineers, but where there is less theory and more practice, there is less criticism and more praise.

The Canadian Ingersoll-Rand Company has been associated with the modern movement in shop management for a number of years, since the days when Mr. F. A. Halsey applied his premium system of payment. However, until 1917, the system was considered mainly on the basis of premium, that is, rather from the standpoint of labor than from possibilities in improved routing of week, etc. The present system is, in the main, that of H. L. Gantt, with modifications due to local conditions. The Halsey premium system has proved to be satisfactory, and is that used at present in the plant, though with the change that the workman has half his gains in time instead of one-third as in the original plan. A standard time is set for all operations, based on careful time-study, and the operator is paid for half all time saved at this standard daily rate.

Many systems of scientific management have been wrecked through too little reliance on the shop foreman. After all, the shop foreman is generally a mine of information, and this should be used by making the foreman realize that with the modern system he has as much responsibility as ever, and has lost no power or importance. This principle is at the bottom of the system of production management now in practice at the plant of the Canadian Ingersoll-Rand Company, and the foremen have an important part in the working out of the new system.

Time-study, standard time for operations, and premium pay, while very important, are not the whole of modern production management. The first essential in the shop is to see that the various machining operations are essential, that they are done in the right way, and, as far as possible, done in the same order for every lot that goes through the shop. With the right operations done in the best way, the next thing is to determine the correct standard time. Time-study, if carried out honsetly, is of great value both to the company and the machinist; the latter soon realizes that he really is making more money, and the company gains by the extra speed. With all this information at hand, it becomes easy to lay out the work to the best advantage; here the foreman's experience is of great value, and all schedules are laid out in consultation with the shop superintendent and foremen. With definite



PNEUMATIC TOOL DEPARTMENT



INTERIOR OF DRILL SHOP.
(Note) Direct lift air hoists serving engine lathes and turret lathes.

schedules for the work, machines are kept busy continuously, and the "machine-idle" item is kept down to a minimum.

An important item of shop management is that of tools; few shops know whether their expensive tools and fixtures pay their way, and the tool store-room is apt to become a museum of "dead" tools. The system now being put into practice by the Canadian Ingersoll-Rand Company includes a simplified system of tool-storage, centralized tool store-room, and no "dead" tools in the tool store-room. At the same time, the cost of tools and jigs is being followed up to determine whether they pay their way.

It is of course impossible to describe a modern shop system in a few hundred words, but the above gives a rough idea of the system in force at the plant of the C-I-R-Co. It will be noticed that it deals more in practice than in theory.

AN OBJECT LESSON IN MACHINE DESIGN

The connecting rod shown in the accompanying photograph was taken from a high speed air compressor on medium duty work, which had been in service for only a year, and which, at the time of failure, was working under normal conditions. The breakage of an important part like this is usually a serious proposition, and, in this case, practically the total destruction of the machine, as well as entailing a great expense and delay. As several similar machines, but of different sizes, have recently failed in the same way, it would tend to show that it must be due to defective designing.

This connecting rod was made of a steel casting, and on examination of the photograph it will be noticed that the fracture at "C" is of a very crystalline nature, indicating fatigue, while that of the cap at "B" shows large blow holes, which unfortunately occur at the weakest point, where the metal is cut away for the large capscrew "A." It will be noticed also that at the opposite side of this hole at "D," there is an indication of a shrinkage crack, and it is probable that the cap failed here first, thereby causing the rod to break.

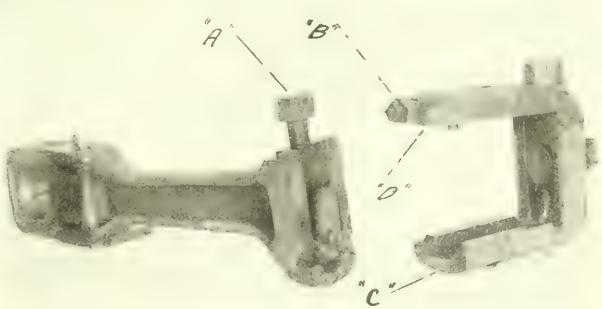
Machine parts which are subject to repeated shocks or to continual stresses in different planes can not be designed satisfactorily from the knowledge of such materials under ordinary stresses, such as tension and compression. It is only by the study of cases like this, and by the testing of the materials under consideration, under conditions as near the actual as possible, that we can be reasonably sure of the correctness of our design.

Had this connecting rod been made of vanadium steel this failure would not likely have happened, as this special steel is not susceptible to fatigue, and has an unusual capacity of resisting repeated stresses. These facts have been proven by numerous tests under conditions of this kind, and consequently it would have been more satisfactory to have used vanadium steel, as any increase in cost would be more than offset by the extra service and reliability to be gained. Unfortunately at the present time there is a great tendency on the part of some manufacturers to cut down costs by using the least expensive steel, detrimentally to themselves and to the customer.

BUSINESS REORGANIZED

The business which has been successfully carried on by G. A. Marshall & Co. has been reorganized and enlarged, and will henceforth be known under the name of Marshall, Son & Bunney. The head office will be at 39 Richmond St. East, Toronto. Arrangements have been made for the firm to represent some of the most reputable Old Country concerns. It is their intention to stock tool steel, alloy steels, files, drills, saws, tools, vises, axles, springs, automobile accessories, wickless stoves, brazier lamps, etc. The new firm will represent and be sole Canadian agents for Wm. Atkins & Co., Ltd., Sheffield; C. & J. Hampton, Ltd., Sheffield; Jos. Evans & Sons, Ltd., Sheffield; J. Brockhouse & Co., Ltd., West Bromwich; Howie & Burley, Birmingham, and W. Gilbertson & Co., Ltd., Swansea.

Mr. G. A. Marshall was for some time established at 70 Lombard St., where he carried on a flourishing business in high speed steel, cutlery, etc. He has had over 30 years' experience in the cutlery and steel business. G. R. Marshall has been overseas for three years, with the rank of Captain in the R.A.F. Previous to his joining the Air Force he was connected with the business of his father on Lombard St. Walter G. Bunney, the other member of the firm, has for 21 years been associated with Jonas & Colvert, Sheffield, latterly in the capacity of general manager of their branch firm, W. T. Beesley & Co., manufacturers of cold rolled steel and wire of all descriptions. All the members of the new firm of Marshall & Son & Bunney are practical men, thoroughly conversant with their lines and with the requirements of the trade to which they will cater.



VIEW OF BROKEN ROD

I. M. Curious Receives Oil for His Lamp

Being a Reply to the Article Published in the April 24th Issue on the Search of a Standard System of Dimensioning Drawings. This Reply is by

DONALD A. HAMPSON

COMMENTING on that article in the April 24th issue referring to the lack of uniformity in dimensioning drawings, there is "much that might be said on both sides." In reality it is not so much the lack of uniformity that hurts, it is the lack of workability: aside from the record they keep, the end and aim of all dimensions is to convey certain sizes as determined by one person to others who have occasion to need those sizes in the performance of some sort of work.

Now if the dimensions are given in terms which are readily workable, the measurements can be made with speed—if the dimensions are given in terms that are inconvenient, the work will be delayed and mistakes may be looked for. It is a matter of adapting the dimension to the class of work done by the shop and, if the drafting room persists in using terms that are awkward for machinists to follow, then it shows a decided lack of co-operation that should be relieved by a few first-class dismissals.

In the ordinary run of small and medium sized work, the calculations which have to be made by the draftsmen are more frequently in inches than in any other unit of length—the inch is the standard unit for pressures and strength and surfaces—and in putting the measurements from these calculations upon drawing, there is seldom any good reason for translating inches into feet and inches. Machinists have or have access to all lengths of "scales" from an inch up to 24 in. in most shops and the most accurate dimensions fall within this larger extreme, so that the quality of the jobs turned out is based on the eyesight of the workman rather than on the fact that nineteen and five thirty-seconds was expressed as all-inches or feet-and-inches or that one twenty-four inch rule was used or two twelve-inch ones. (The machinist who can't make such a change mentally while he is looking up the rules or while his cut is running had better brush up and spend his evenings on the arithmetic course now offered in CANADIAN MACHINERY.)

The work itself determines what kind of rules a machinist has to have. As has been said, the work in each shop follows the same line quite closely and as a consequence the oldtimers have the most convenient sizes of tools and the newcomers do (or should) fall right in line. Any designing and drafting room that deserves the name will very quickly see what is the best for efficient shop work.

Some shops will run to rough work of large sizes—work that has to do with structurals and outside layouts—, and here we find the foot the most convenient unit, with fractional parts of a foot expressed in inches. Work that is laid out by surveyors for shop men is generally in feet and inches, (though often in feet and tenths of a foot, because surveyors are dealing with such large dimensions that to state them in inches would be worse than the metric system) and such a habit of dimensioning is carried out without thought of inconvenience to the men in the machine shop.

When the run of shop work is finer, the inch system of dimensions has everything in its favor up to and over the 48 in. mark. If the folding rules carried by machinists or the steel tapes are not accurate enough for the particular purpose, gauges are supplied by the shop, but in general, when long lengths are encountered, they don't have to be extremely close.

The automobile shops, starting as they did, new and untrammeled and free to make standards of their own, very wisely decided to discard the use of feet and to use inches almost exclusively. No one is bothered to measure a 144" wheelbase or a 30" frame or a crankcase 26⅞ over all or a 34" tire. One cannot fail to see the ease of speech, the ease of writing, and the lessened chance of error in noting the tread as 56" against the 4' 8½" as persisted in by the railroads. The various manufacturing operations are carried forward without conflict on an inch-only basis.

The selection of the dimension system depends upon the average class of work, but as drawings do have to be sent into other shops and as drawings from other places are sent in to us, it is unreasonable to expect the easiest system to always prevail—in fact it would be impossible. Also, if dimensions never appeared except in the approved form, there would be a sameness to work that would breed mental laziness just as we would tire of looking at new automobiles if they were all Cadillacs.

There is no trouble for modern machinists to get along with any terms in plain English. The writer knows of one shop that is large enough to have a world-wide reputation, but small enough so that when work is slack in the manufacturing departments they shift the men around or parcel them around to the machinists on repair and special work as helpers. That shop does quite a little tap and die work for pipe fittings, it makes automobile parts in a small way, it makes supplies for printers, it exports to France and South America, it does the average run of general machine shop work. If there was ever a need for uniformity in dimensions, it would seem as if it was there.

But no. Sizes are given to the particular job and the standards in that field. Printers have an inch that is but .996" with the commonest fractions, thereof, as "points," and "picas" (1-72 and 1-6 of the .996" respectively). Pipe threads include the 11½ and others differing from the U.S.S. and the S.A.E. and include the standard pipe taper of 3" to the foot. The export stuff goes in English and metric. There is as nice an array of non-uniformity as could be found but there is no confusion, on drawings or verbally. If parts are wanted in printers' sizes, the drawings give them so because it is easier to comprehend and quicker and stock sizes of steel are kept that way; if metric parts are wanted, the drawings are dimensioned as so many MM.; "Std. pipe taper" is marked where required; and when exact measurements must prevail, they are stated in thousandths. Confusion and mistakes and kicking are almost unknown because the drawings are made up in workable style regardless of uniformity—the drawings give them so, because it is easier to comprehend it helps outside as well, for if a customer needs a drawing, it is sent to him and it is in the language he understands.

So far as the two-foot rule is concerned, the writer has never seen a machinist that had one in his kit. Sometimes when men were hired that had been mechanics in the field of carpentry or building or wagon work, they appeared with two-foot rules, but they soon discovered that the materials of a machine shop do not let you make a dig in them with the end of the rule, this dig or scratch being the line of measurement which varied an eighth or so according to the slack in the joints and the rounded condition of the ends. The modern folding rule is so much more accurate and lastingly so, it has a much greater range, and takes up very little more pocket space withal.

Commenting also on the subject of "Machine Design

and Horse Sense," the same initial statement might be made. There are so many sides to the question and the big designers occasionally make such mistakes amid their greater successes, just as the workmen unaccountably spoil a nice job once in a while amid a monthly average of 100%, that no one can really call the other black. Co-operation between shops and planning department and an exchange of ideas followed by a sifting in which jealousy has no part will produce the best machine in the end.

But the designer is not so free to act as the shop men sometimes think. There is a commercial side to machine design: the time may not be ripe for radical changes, the expense of re-designing and bringing out of a line of machines of several sizes is often so great that it has to be dropped; prevailing demands in one decade may be quite different from those of another and it is only in a few cases that manufacturers can go to the expense of creating or changing a demand.

Improvements are often made years before their time. There were quick change devices for thread cutting on lathes and beltless feeds for machine tools forty and fifty years ago, but they did not find favor until recent years. Ford alone stood out for light weight automobiles for a long time, but now all makers work to that end—the self-starter and electric lights were doing business ten years before the demand for them became a command.

The technical graduate without experience and the inventor have their place—they should not be broadly condemned without even a hearing; that actual practical experience we hold so highly often rubs the bloom off and changes them from men of vision and ideas to followers and standpatters. The worst of the men in the business is that their minds unconsciously follow a certain track, that of standard practice, while the inventor is not so restricted. Neither the professional nor the visionary has a monopoly of ideas.

Probably the most important invention ever made in fast newspaper presses was that of running the strip of paper over that triangular-shaped plate (I've forgotten its name at this moment) curling the edges down over the sides as it nears the apex and thus folding it on the run. Previous to this separate sheets only had to be fed or the endless strip stopped, cut off and drawn between rollers to secure a fold; but the invention named turned the strip into the live member which forced itself into shape as it ran, making possible the modern high speed press, which was only possible when the paper ran continuously and from a roll or web. Designers had worked on the problem of **pulling** the paper through, but without success; but a humble workman conceived the idea of its **forcing** itself through in the manner stated. "It made old man Hoe sit up and scratch his head," as his secretary told me.

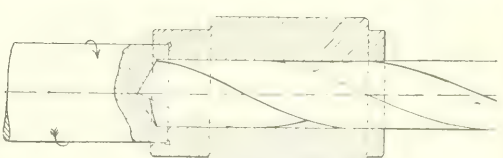
An inventor wanted some castings with chilled surfaces and took the job, along with the rest of the work, to a small shop. The superintendent admitted that his experience with chilled work was confined to reading only, but he was willing to do his best and to co-operate with the foundry. The foundry had only done small chilled work, but they were willing to try, so the two places worked together on the job and turned out six good No. 1000 castings out of the first six tried. Some busybody got the inventor's ear to tell him that those people refused to pay for the pieces even after they had been in use and proved quite satisfactory. Then he took the job to the A—— Iron Casting Co., who laughed at the other's work and proceeded to turn out the castings in the "right way"—the accepted way. Well, after a month had gone by, they began to hedge and ask to have the design changed because of too great manufacturing cost, but the real reason was that these specialists had made a dozen castings and had saved only one and that one was doubtful. In the end, they asked the "experimenters" for their method.

A saw manufacturer wanted to make a lumberman's saw with clearance back of the teeth, which were cut on an arc of a thirty-foot circle. Designers and shop men told him that it couldn't be worked, but the manufacturer found a correspondence school graduate who laid out a design and the machine was made in the saw factory's own small machine shop. It worked, and that manufacturer had the satisfaction of producing commercially the first crescent ground saws, an improvement that was widely copied.

All of which goes to show that the ethics of the business should include a serious, unbiased consideration of the ideas of all men with sufficient push to submit them. Then, when the manufacturing problems have been solved (and they always can be), the financial and commercial sides of the question can be carefully weighed and a design evolved which will be a success. Nothing is altogether perfect and it takes a combination of horse sense and experience and education and vision to get by with a public that is cold blooded in its demands.

GUIDE BUSH FOR STARTING DRILLS ON ROD

THE drawing represents a device that was successfully applied on a turret lathe to start drills accurately in the centre of bright bar. The latter was not perfectly straight, and the effect of its bent state was to make the ends liable to "run out," so that the ordinary device of starting with a centre-cutting drill was inapplicable. A bush was turned up similar to that given in the section, fitting the drill body nicely, recessed out at the nose to just slide over the stock, and knurled on the enlarged body. After case-hardening the bush was brought into use by sliding it along as illustrated to force the drill point to start centrally, after which service the bush could be slid back to the tail end of the drill, leaving it free for rapid cutting. This device gave the best average of hole through each piece, holding up safely within the limits for subsequent grinding. FRED. HORNER.



GUIDE BUSH FOR DRILLS

Means of Ignition and Principles of Magnetos

Principles of Magnetism and the Generation of an Electric Current—Construction of the Magneto, Dual Ignition Coil and Engine Starter—Care and Maintenance—Duplex Starting

By H. POLLARD, Lieut. R.A.F.

In our January 16th issue, we ran an article by the above author on aero engines. In this article we omitted to [illegible] credit to the Macmillan Co. for certain matter taken from a book published by them on the subject. We now mention this point, at the same time stating that in the following article there are also cullings from the books as published by this firm on above subject.

IT is with no small amount of temerity that I have named this article as above, for I think it would be more correct to call it "Means of Ignition." I shall endeavor to give in a brief fashion a description which will, I hope, convey to my readers a rough idea of their particular type of ignition. It would be impossible to describe in this short article all the forms of ignition which are to be found in use to-day. There is the cyclist with his single and twin cylinder machine, the automobile with its high tension magneto, its self starter, in some cases its low tension magneto, and in other cases the auxiliary starting magneto. In many other cases we find ignition accomplished by means of a battery and coil. I shall endeavor to give a short, pithy, practical description to enable the amateur to come into closer touch with that most delicate part of his machine, the magneto. It is impossible to enter into a description of the magneto without first of all explaining in rather more detail than the average person [illegible] credit for, the principles of magnetism which are, of course, the primary source of power in the magneto. Just in closing this introduction I would like to say a few words regarding early magneto systems. The ones I refer to are the original low tension magneto, and the special low tension magneto sparking plug systems, which are now of only little more than historical interest. The low tension magneto was of very simple construction, but the special sparking plugs used with this system were of a very complicated nature, and involved the use of tappets, springs, cams, and many other mechanical parts. The special magnetic plug system never was extensively used, although in many ways it was an improvement on the type already mentioned.

Production of An Electric Current

To generate electricity it is necessary to have the assistance of magnetism. Magnetism can be produced in iron or steel to almost any desired strength. The act of magnetizing a piece of steel is to cause each particle of metal to become a magnet. All these small magnets become laid out in one certain specific order, the whole arrangement on completion being a magnet with a North and South pole. From any magnetized piece of metal we have lines of force radiating



FIG. 1

Section before Magnetization

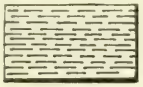


FIG. 2

Section after Magnetization

in a certain manner. The space through which these lines pass is known as a field of magnetic force. It is from such a field that we derive our initial energy in the magneto. Examples of various fields of force are shown in Figs. 3, 4, and 5.

The magnets as used on a magneto are simply plain bar magnets bent over in the form of a horseshoe. They are fitted with soft iron pole pieces as shown. The reason for this is as follows: The permeability of iron is higher than that of steel. In simple language this means that you can pass more lines of force per square inch of section through iron,

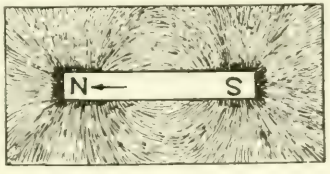


FIG. 3. DIAGRAM SHOWING FIELD OF FORCE AROUND A BAR MAGNET

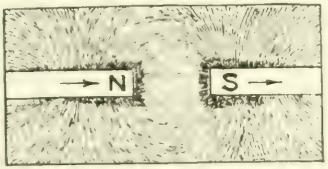


FIG. 4. FIELD OF FORCE AROUND TWO UNLIKE POLES.

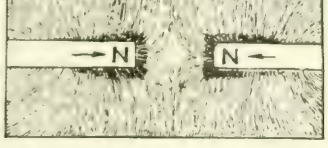


FIG. 5. FIELD OF FORCE AROUND TWO LIKE POLES

than you can through steel. Therefore the object in fitting soft iron pole pieces is simply to increase the strength of the field in between the poles of the magnets, so that we shall have a higher magnetic field and consequently a higher primary current in the magneto. Electricity is produced by cutting lines of magnetic force with a coil of wire.

Studying Fig. 7, we see a coil of wire whose ends are connected to a galvanometer or voltmeter. A bar magnet is shown, so that the lines of force pass across the coil. In moving the magnet from A to B we cause the lines of force



FIG. 6.

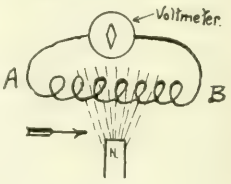


FIG. 7.

to be cut by the coil, thus giving a current in the coil which is registered by a deflection on the galvanometer. This is the principle which governs the working of the primary.

Taking a look at Fig. 8, we see that the magnet in the previous sketch is replaced by a coil which is connected to a switch and battery. When the switch is closed a current passes through the coil A and lines of force radiate across and cut the coil B, causing a current to be induced in the coil B. This is the principle underlying the working of the secondary.

Construction of the Magneto

Almost all the magnetos of to-day are built with H section armatures. The primary winding, which consists of a very few turns of moderately thick wire is wound around this first. One end of the wire is connected rigidly to the armature and the other is led out to the contact breaker. Attached to this winding is the condenser and the switch.

The secondary winding, which consists of a very large number of turns of exceedingly fine wire, is first of all attached to the primary and then wound

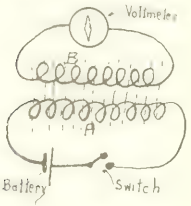


FIG. 8

around and above it, the other end being led off to the distributor. From here, of course, the current is distributed to the various cylinders in the correct order of firing. This will be more clearly

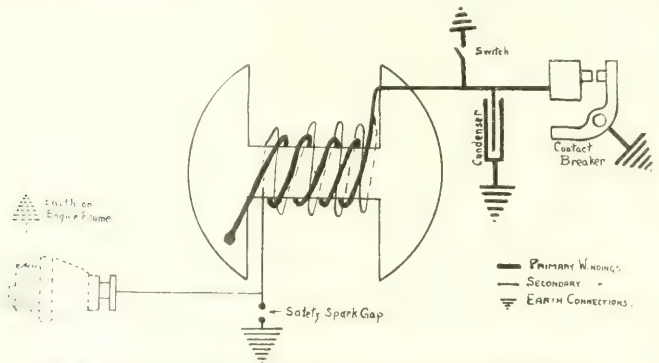


FIG. 9. DIAGRAM SHOWING INTERNAL CONNECTIONS OF A MAGNETO

understood from an inspection of the accompanying diagram, Fig. 9. Before explaining the functions of the various parts, I would like to say a word or two regarding the build of the armature core. The armature core is built up or "laminated" of a large number of very thin stampings of soft cast iron, each one being insulated from its neighbor by means of a very thin coating of shellac varnish. The reason for this is to reduce the internal resistance of the magneto so as to produce a higher efficiency. Before proceeding with the different types of magnetos, I will explain the functions of the various parts. A contact breaker is a mechanical device fitted to the primary circuit of a magneto to cause a sudden interruption to the flow of current in that circuit, simultaneously giving rise to a high tension current in the secondary. When the contact breaker points are together, a current of electricity flows permanently through the primary windings, and lines of force from the primary windings are passing constantly across the secondary coils, but there is no cutting effect. At the point of break, the field of force, which has been passing across the secondary, is caused to collapse, and in so doing cuts the secondary winding, producing a high tension current, which is expended as a spark at the sparking plug.

A condenser is fitted to the primary circuit of a magneto to absorb the reverse or back current at the point of break, and also to increase the efficiency of the spark. The manner in which this operates is as follows: When the platinum points are together there is a closed circuit and electricity flows continuously along this path. At the point of break there is a certain amount of electricity left in the circuit, which, if left there, would produce a certain amount of heat, which would probably detrimentally affect the insulation of the windings. This electricity is absorbed by the condenser and when the points come together again this energy is given back to the primary winding, thus increasing the strength of the current in that circuit, and also increasing the strength of the spark. The condenser is composed of sheets of tin, interleaved with sheets of mica, and can be said to function as a storage battery for the primary circuit, and not as the mixing chamber of the carburetor, an indignity which it has suffered by more than one aspirant to magneto fame. The switch is fitted purely to short-circuit primary circuit, or,in other words,to provide a direct and permanent path for the current to flow to earth, thus preventing a possibility of a spark occurring at the plug.

The safety spark gap, which is found on the secondary circuit, is, as its name implies, a safety device fitted so that in the event of any unforeseen obstruction to the flow of current arising in the secondary, a spark can occur at the gap and thus prevent the windings of the secondary from being burnt out.

By an obstruction is meant such an event as a plug becoming sooted up or oiled up, or a high tension lead dropping off. The above description is only a rough explanation, but it will, I hope, serve as a foundation for the reader to make a more detailed study of this work at a later date.

Combined Magneto and Coil

This type of ignition is to be found chiefly on American cars. A low tension current is generated in the armature and a similar form of make and break is fitted as in most magnetos. This low tension current passes into an induction coil, which differs very little from the type of coil used with an accumulator. In a self-contained type of machine it is usual to find the coil under the arched portion of the magnets. This is done to conserve space. The advantages of this are plainly seen, because we can get more wire on a coil than on an armature, and the high tension circuit being kept apart from the armature, breakdowns are largely eliminated.

Dual Ignition Coil, and Engine Starter

By means of pressing a button which is situated on the dash, the engine is started. One set of plugs is required and a switch on the coil enables the magneto to be brought into circuit after the engine has been started on the coil and battery. The high tension distributor and the contact breaker on the magneto are used in either system and should the magneto fail, it is possible to run the engine continuously on the coil. A trembler is fitted to the coil which can be brought into action to give continuous sparks by turning the starting button round; starting is thus accomplished if the sparks from the coil are not effective.

As an alternative to the above we find in some cases an auxiliary magneto fitted for starting. This is simply a small high tension magneto, but it is not fitted with a distributor. In the centre of the distributor of the main magneto is a special carbon brush with a terminal connection on the outside of the distributor. From this terminal a connection is made to the armature of the starting magneto. The starting magneto is, of course, operated by hand. This is a form of starting device that is very prevalent in aeronautical circles.

In passing, it would perhaps be of interest to say a word or two regarding the principle of automatic advance magneto. This is quite distinct from the ordinary magneto with a fixed timing point, or the usual variable timing arrangement controlled by the driver. In some machines it is done by combining a centrifugal force device or governor with the armature, which ensures that at all speeds the contact breaker will operate at the point of maximum efficiency as well as at the correct time with regard to the piston position. This design, of course, ensures automatic timing of the spark as well as a maximum intensity for any given speed.

The Two-Cylinder Magneto

Two-cylinder engines are made with different crank systems, one being at 180 degrees and one at 360 degrees. In the former case the two explosions occur in succession, with a long interval till the next two explosions. In the latter (i.e. 360° type) the explosions occur at equal intervals. The same type of mag-

neto is used in both cases, but it is run at different speeds. In the 180° engine [illegible] 360° engine it runs at half the crankshaft speed. In place of the usual slip-ring we find the distributor, which consists of a half-circle sector of metal, mounted on the armature shaft of the magneto. This distributor makes contact alternately with each carbon brush, these brushes being diametrically opposed to each other. From here the current is led to the two plugs. It is important to note that two non-effective sparks are produced immediately after the effective sparks, in the case of the 180° engine, these occurring at the beginning of one exhaust stroke and the end of another. In the case of the 360° engine a non-effective spark occurs in between the effective sparks.

Care and Maintenance

To those who have only a little or perhaps no knowledge of the magneto it is best that they should leave it entirely alone. If attention is given to it about every 150 hours of running it will be found to be quite adequate. The magnets themselves will, under normal circumstances, retain their magnetum for a period of three to six years, when they can easily be remagnetized. The make and break must be kept clean, points adjusted and perfectly flat. The ball bearings require periodical lubrication, and the maker's note as regards this point should be strictly adhered to It is often a great mistake on the part of amateurs to overlubricate, thus causing such troubles as oily distributors, collector rings, carbon brushes, etc. The high tension leads may become worn, and, in consequence, a short-circuit may arise which may either be intermittent or permanent; sparking plug troubles, such as broken insulation, sooty plugs, or oily plugs caused by excessive lubrication of the engine.

The gap on the sparking plug should be very carefully noted, and made to be about .020 inches, or half a millimetre. The reason for this is because of the comparatively low voltage when starting and also to ensure a spark passing under the resistance offered by the highly compressed charge. A large gap would tend to strain the insulation of the armature, and so allow a spark to pierce the insulation and pass to the frame. This is, of course, very highly improbable nowadays, as it is only with unfair treatment that such a case of affairs would exist.

Duplex Sparking

The object of using two sparking plugs in one cylinder is, of course, with a view to increasing the power. It does quicken the rate of combustion and increases the force of explosion, thus increasing the power of the engine. To think that by placing an extra plug in the cylinder in a haphazard fashion will give an increase of power is to make a very serious mistake. Great discretion [illegible] necessary in the placing of the two plugs. They must be situated in parts of the cylinder where the gas surrounding the points is as nearly as possible of the same strength and proportion. The two plugs must also be perfectly

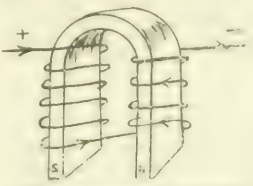


FIG. [illegible] METHOD OF WINDING WIRE AROUND MAGNETS TO REMAGNETISE SAME

synchronized so that the plugs spark simultaneously. Unless these points are very closely observed, no good can accrue from the use of two plugs.

Coil and Battery Ignition Systems

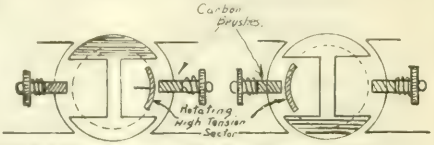
This system of ignition is now only met with at very rare intervals. It consisted first of a single coil and contact breaker. It consisted later of a trembler coil which made starting much easier. The universal adoption of the magneto, though, has necessitated the abolition of this rather cumbersome and troublesome mode of ignition. Before passing on to accumulators, I would like to add just a few words on ignition coils.

Ignition Coils

The fundamental purpose of a coil is to intensify or increase the voltage from an accumulator or dry battery. You may only have 4 volts from an accumulator, but by passing it through a coil it will become increased to, say 25,000 volts, according, of course, to the size and design of the coil. It is, of course, understood that it is necessary to have a very high voltage to enable a spark to jump the gap under the pressure of the gases in the cylinder. The accompanying sketch will give a rough idea of the construction of the coil. It consists of a soft iron core, over which is wound two layers of moderately thick wire; over this is wound from 15 to 20 layers of very fine wire. Each layer is carefully insulated from the next by a layer of waxed paper. The secondary is not connected to the primary, its two ends being connected to the spark plug; the circuit has to be completed across the gap of the two points. The primary winding is connected through a contact breaker and a trembler to the accumulator or battery. The object of the contact breaker is to time the spark so that it will occur at the correct moment. The trembler is attached to the coil itself and is operated by the magnetism of the core, and its object is to produce a very rapid and intermittent interruption of the currents as it flows through the coil. We find then that the electro magnetic induction from the primary generates a high tension current in the secondary just as long as the contact breaker and trembler are in action. This, however, only lasts for an infinitesimal fraction of a second. The above is only a brief explanation, but it will serve the reader as a foundation for further study.

Charging Accumulators

I would strongly recommend that charging of accumulators be done at any charging station, because it is so very



easy and cheap, but it would perhaps be of interest to point out how it can be done, so that the amateur can assuage his thirst for this particular detail. It is invariably done from a direct current circuit, but it can be done from an alternating circuit if one has the necessary apparatus which is of a rather more complicated nature. In charging from an ordinary domestic lighting supply it is necessary to first of all find the negative and positive pole. If these are not marked, connect two pieces of wire (one to each terminal), put the switch in the off position, now dip both ends in a glass of salt water and you will observe bubbles of gas rise from one wire. This is the negative pole. Connect this wire to the negative pole of the accumulator and the other wire to the positive pole, and your battery is now being charged. During charging gas will be given off freely, and when fully charged the acid will become milky in color. The accumulator can be tested for a full charge, either by testing the specific gravity of the acid in each cell or by a voltmeter. There are, of course, other methods, an illustration of one of which is shown, but it is quite a simple matter for the reader to exercise his ingenuity to make a home-made arrangement to suit his particular case.

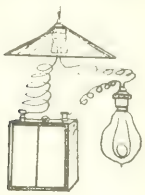
Storing Accumulators

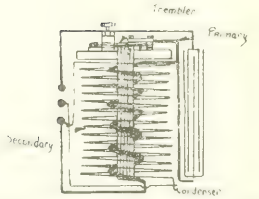
In storing accumulators, if the following points are observed, very little trouble will be experienced. If it is an accumulator of standard design and it has never been charged, it will be sufficient if it is stored in a dark dry place. If it is an accumulator that is charged and you require to store it for an indefinite period, discharge it through a lamp, then empty out the acid, and store as previously mentioned. If you desire to store an accumulator partially charged, say for about six months, first of all charge the accumulator fully, dry the case thoroughly and grease the terminals, and store in a dark dry place. It will then be found at the end of the time to have lost very little of its strength. There is sometimes a slight film of sulphate formed on the plates when drying, but this will disappear when the accumulator is charged again.

In closing this article, I would just like to enumerate a few of the most

common magneto troubles and their remedies. If you could make an analysis of all the magneto troubles you [illegible] to find what a large percentage of them are to be found at the contact breaker. We have first what is known as sticking of the rocker arm. That is due to moisture swelling the fibre brush on which this arm oscillates causing the arm to stick fast and thus putting the magneto out of action. Oil must on no account be used to remedy this trouble, but the hole in the

CHARGING AN ACCUMULATOR THROUGH A LAMP SOCKET.





UP. 71 ARRANGEMENT OF WINDINGS OF A TREMBLER COIL. THE THREE TERMINALS ON THE LEFT CONNECT UP-TOP TO BATTERY, CENTRE TO SPARK PLUG, LOWER TO CONTACT BREAKER.

bush must be enlarged a very small amount with a reamer. Sparking at the platinum points is another common trouble, and this is due to either condenser failure or pittedness of the points. By pittedness, I mean that the points of the contact breaker have become rough or broken. These must at all times be kept perfectly smooth and flat. Another trouble which I have already mentioned is that of overlubrication, and I here again trespass on the reader's time to lay still further emphasis on this point. It is impossible to enumerate all the numerous troubles that may occur through this trouble. In closing I would commend all my readers to leave the magneto and its attendant worries in the hands of a competent mechanic, because in endeavoring to repair the trouble you may, as the saying goes, go further and fare worse.

THE POTASH INDUSTRY

By M. E.

THE trade in potash, which has become one of world-wide importance, was at the outbreak of the war almost entirely in German hands; and so confident was Germany that England would eventually have to come back to her for this commodity that it has often been stated by the experts in that country, and it was a favorable saying of the Kaiser, that England and the Allies would be compelled to sue for German potash after the war was over. In fact this was considered to be one of the powerful economic levers by means of which Germany might secure from enemy countries the necessary supply of other raw materials for her various industries.

Potash is widely distributed in Nature and forms an important constituent of large portions of the earth's crust. It is found in the form of soluble salts in nearly every fertile soil, and great stores of it are contained in sea water. It is an essential part of the food plants and passes from them directly into the bodies of animals. Formerly indeed one of the best known sources of potash was the suint, the grease from the wool of the sheep, and it was also obtained from the ashes of plants and from calcined seaweed. Associated with sodium nitrate, it occurs in large arid tracts in South America as an efflorescence on the soil.

About sixty years ago the rock salt beds of Stassfurt in Germany began to attract attention, and valuable deposits of potassium minerals were found at depths of about 850 feet below the surface. Other still more prolific beds were reached at a depth of some 1,100 feet, but the rock itself and the brine or deliquescent salts of this district also proved to be a rich source of potash; and so cheap and so abundant were the products of Stassfurt that all other potash manufactures had to be abandoned. While the rock-salt works are mainly Government property, the chief chemical factories are in private hands, and the output of potash in recent years, or shortly before the war, became so large as to need some regulation in order to avoid a glut in the market. It was asserted in 1910 that the daily flow into the Elbe of magnesium chloride and common salt, which were the waste liquors from this industry, represented a weight of chlorine alone estimated at 975 tons, and rendered the water of that river distinctly saline to the taste. In view of the flourishing state of the industry at Stassfurt, Germany naturally saw no need to encourage development in Alsace.

In 1904 extensive deposits, resembling in all respects those of Stassfurt, were discovered in Alsace over an area of about 7 square miles, north-west of Mulhouse. The estimated available quantity in this locality is 300 million tons, and some fifteen shafts have already been sunk, though production has hitherto been much hampered by various legal and other restrictions consequent upon German ownership of the land.

Notwithstanding the large stocks of potash in the hands of the trade, when the supplies from Germany were cut off by the war, Great Britain, and indeed the world, was faced with a famine of a substance that is needed by agriculturist and for many military purposes as also for the manufacture of matches. It thus became necessary to consider the possibility of new sources of supply.

In speaking of the imports of potash, this word is used in several different senses, and it is not an easy matter to arrive at definite figures. It is alleged that in 1913 Germany exported 1,800,000 tons of potash, of which 865,000 tons went to the United States, 150,000 tons to Great Britain, 95,000 tons to France, and smaller amounts to other continental countries. It seems likely that much of this potash was in the form of "kainit," an impure sulphate containing also common salt and magnesia salts. The custom of the trade was to sell kainit on the basis of its contents of soluble potash, with a guaranteed percentage of not less than 12 per cent. soluble. Worked out on the unit value, potash fetched a retail price of 4s. 6d. to 4s. 9d. per unit (£22 10s. to £23 15s. per ton), while potash sulphate was 2s. 6d. per unit (£12 10s. per ton) and on this basis kainit, with about 12 units of potash, cost 54s. to 57s. per ton. Since August 1914, potash has gradually risen in price, until in October 1918 it fetched 26s. per unit (£130 per ton). This would place kainit, if procurable, at £15 12s. per ton.

As already mentioned, potash has been extracted in considerable quantities from greasy fleeces, and in February reference was made to the attempts being made at Bradford to deal with this source of supply.

Another source of potash is the flue-dust from cement works, blast furnaces, and coking plants. Considerable progress has been made in America in treating the dust deposited from rotary cement kilns for the recovery of this substance and it has been suggested that an increased yield might be obtained by adding feldspar to the cement constituents. In Great Britain the Government has taken steps to deal with blast-furnace flue dust, and the Board of Agriculture and Fisheries has issued a "leaflet" on the subject setting forth the prices to be charged from June 1918 to May 1919. The charges would appear to contemplate a range of potash contents from 2 to 14 per cent., and the price is estimated at from 7s. 6d. to 8s. 6d. per unit. Flue-dust containing 12½ per cent. of potash is valued at 117s. per ton. This would be equivalent to 9s. 5d. for the unit of potash and 5s. 6d. per unit of potash sulphate.

Much attention has been directed in America to the utilization of feldspar as a source of potash and more than 100 patents have been secured for various modes of working. Other American sources of potash are found in the Lakes of Lincoln, Nebraska, where a thick coat of cream, floating on the surface, said to yield potash in abundance. The Consolidated Gold Fields of South Africa claim to be producing 43 tons of potash per diem from their workings under the Trona Corporation, at Searles Lake, California.

Wanted—Rational Systems

A Plea for the Adoption of Real Rational Systems, Not the Cut and Dried Form Method as Usually Adopted. We Invite Readers to Give Us Their Ideas on This Subject

By ROBERT MAWSON

THERE [illegible] more bunk written [illegible] and systematizing plants, large and small, [illegible] that the engineering profession has seen or heard about during the past decade.

It reminds me very much of the coal saving compound that has been the means of providing a lot of easy money for a few and a lesson in how people can be fooled.

When we speak of chemicals to most people, especially if the names be long and almost unpronounceable, it acts like a bait to the sucker. There are many who nibble, and unfortunately some who bite.

The same with systems: describe it in abstract terms and describe it in such a way that few people understand it, and there are many plant owners willing to give it a trial. Let me say here, however, at the start, I am not averse to a system when installed in a rational manner, for when used in that way, the best operated and managed plants are benefited from them.

It is those systems which are of the unbending, cast-iron, one-for-every case, that have proved a failure.

For an example a factory manager reads an article illustrating a system which has proved beneficial to a certain plant, and he decides to use it carte-blanche in his shop, and invariably he finds it does not come up to the rosy hue painted in the article. He is disgusted and says: "Well, now I know these systems are no good."

If on the other hand the manager had [illegible] described and changed or modified it to suit his particular needs [illegible] conditions he would have found a benefit from using it. The first trouble I have found with many systems [illegible] operational, or made so by the way they are used.

To illustrate the point, I was at one time in an office connected with a plant where system was the one thing in greatest evidence. In fact it stood out like the nose on your face. The office was [illegible] twenty feet square, and in it were located the desks of the general manager and also factory manager.

Each of these executives had a private secretary with separate typewriter: one example of the [illegible] system in vogue in this office is worth reciting.

An Example of Irrational System

To illustrate by an example. If the general manager wished to convey an order or matter of importance to the factory manager he would call over his (general manager's) private secretary and dictate a letter containing this information.

The letter was then produced on the typewriter, being duly signed by the general manager and placed in the outgoing basket, which occupied a position on his desk.

At certain prearranged times during the day the letters were gathered from the various baskets on the executives' desks and carried by a boy to what might be called a clearing room. This letter being amongst them it was carried there to be finally placed in the incoming basket on the desk of the factory manager. It was taken from there by the factory manager's secretary, who opened it and laid it on the desk of his superior.

The factory manager now went through a similar procedure with his reply, which finally arrived after the cycle of systematic motions had been carried out before the general manager for his attention and information.

Now, no reader can dispute the fact that here was a most perfect system, but will also agree that it was a most unprofitable one.

We have only to assume a case where instant decision was necessary and this circle of system followed, the result would be not only disastrous but abject folly.

Such a case of irrational system is far worse than none at all, as it proves both expensive and finally defeats its own ends.

Stereotype Systems

Systems of the cut and dried book form or what I have here called stereotype, are, in most cases useless, and should not be followed without being modified to suit the conditions of the shop adopting them.

A certain friend of mine has been general superintendent of a plant employing about 300 employees for the past 20 years.

It must be agreed that this man during these years must have gathered some knowledge of this particular shop's conditions, more so because of the fact that he has been largely the means in building the business up from a country jobbing shop of three or four men. As I know something of this man's ability I might also add that he has increased very materially the efficiency of the plant.

One morning a gentleman presented his card to the office boy and asked to see the superintendent. He was invited into the executive's office and asked to state his business, and the reply was that he was a system expert.

The superintendent is a wide-awake man, and told the expert to take a walk through the shop and come back with a report how he found things there.

The expert took a stroll as invited and returned in about thirty minutes.

Greeting my friend, the superintendent, he said: "Well, I can do it."

"You can do what?" he was asked.

"Oh, I can instal my system," remarked the expert.

He was then asked what the system consisted of and what it would do.

Pulling out a number of forms and blanks from his pocket he said: "We would use blank No. 264 and form No. 986," etc., etc., showing samples of various shapes and of almost as many colors as we find in the spectrum.

The superintendent thought a minute and then asked: "But supposing we should instal this system what will be the saving to our company?"

"Oh," replied the expert, "I cannot guarantee any saving, but I will assure you of a good, perfect, efficiency system."

Needless to say my friend did not adopt the system.

Now let us find the trouble with the expert and his system, and this will apply to many others.

First I would say that he assumed that he possessed a perfect system, which could be applied to every case.

Very much like a doctor if he attempted to cure every bodily disease with one kind of medicine.

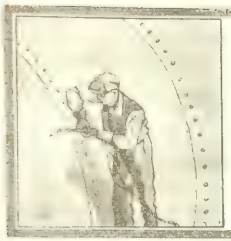
And second—any man who takes a lightning trip through a plant, spending about as many minutes as the superintendent has been years, and endeavors to show that executive how to run the plant, not only insults the intelligence of the man, but conveys the impression that the man doing so is a fake.

Again, a system which consists of only signing and countersigning various colored forms, giving orders and the like, without either decreasing the cost of manufacture or in increasing the production of the plant, may look well in a book, but is not the type either needed or desired in plants to-day.

To summarize the question, the only way in which systems can be used to advantage, call them either scientific, efficient or by any name you will, is to take the best we can find and change or modify them to suit the plant conditions, with the specific object in view of either increasing production or decreasing the cost of manufacture.

And if after adopting a system, it is found that it is not performing this function, let the system go or change it until the desired results are obtained.

Systems are intended to help, not hinder, and if used rationally will do so, and the firm adopting them will profit accordingly.



WELDING AND CUTTING



A Review of Some Modern Methods of Arc Welding

The Author in a Paper Read Before the Institute of Mechanical Engineers, London, Makes Interesting Comparisons of Various Systems

By THOMAS H. HEATON

In January, 1914, the author read before this institution a paper on "Some Modern Methods of Welding." Experiences of the war have led to a great development in the various systems of welding, both electric and otherwise. It may, therefore, be of interests to return to the subject, giving some further particulars. In some respects electric welding has proved under present circumstances more advantageous than gas welding, because of the difficulty of procuring oxygen, carbide of calcium, etc., necessary in gas-welding processes, therefore, the author deals with electric systems only in this paper, chiefly applied to the welding of mild steel.

The author holds no brief for any given system of welding, and in confining his paper to electric welding he does not intend to imply that gas welding produces inferior welds. Indeed, he is of the opinion that each known system of welding has its proper sphere, and that probably any given method may be the best in its respectively most suitable application. The author uses oxy-acetylene welding, and has done so for many years before the war, with most satisfactory results.

Arc Welding

BENARDOS.—This system was patented in Great Britain in 1885 by Nicholas de Benardos and Stanislaus Olzewski, both of Petrograd. It includes: (1) the union of metals; (2) their disunion or separations; (3) the formation of apertures in metals; and (4) the union of metals in layers. The process is thus shown to be of very general utility. That is to say, it can be used for welding, for cutting, and for perforating. It is interesting to note that the Benardos specification mentions metallic electrodes, [illegible] carbon. It also mentions an apparatus called an electric solderer, with two carbons side by side, and a magnet to deflect the flame to the object under operation. The author has manufactured steel barrels, drums and tanks, etc., by this system for twenty-five years with success.

The work is positive to a carbon electrode. Therefore no deposit can take place from the carbon to the work, which is of open-hearth mild steel of good quality. The weld remains soft and is purer iron than the original metal. The current is direct, the voltage being about 90 volts, and the amperes 250 to 500, according to the thickness of metal. There are hammered welds and fused welds, and the results are very good, seeing that the work is designed to suit the process, and the process the work. The arc may be ½ or 2 inches in length, and the heat may be well spread over a fairly large surface, which is, in the work in question, an advantage, because it avoids extreme local stresses in the weld, and tends to prevent deterioration of the metal surrounding the wood.

The speed of welding is considerable. Welds in mild steel 3.5 mm. thick can be made, including the heating and hammering, sound and petroleum tight, at the rate of 2.76 minutes per foot long; mild-steel bosses fused and not hammered at 1.73 minutes per foot of weld; and other fused welds 1.22 minutes per foot of actual welding. Eight inches of 15 mm. diameter carbon of good quality are consumed in welding 50 feet of mild steel ⅛-inch thick.

Cutting Mild-Steel Plates

Length.	Thickness.	Width of Gap	Time		Electricity		Cost of Current and Electrodes.
Ft	In.	In.	mm.	sec.	Units	Amps	d.
1	1	½	3	0	1 75	115	23½
1	½	½	7	10	1 25	120	21½
1	⅜	½	1	25	0 75	120	13½
1	¼	7-16	0	15	0 10	355	11½
shaft 8 dia	12½	40	0	31	75	120	394½

The carbon, 15 mm. diameter, is consumed as follows: about 3 inches in the plates in each case, and 24 inches in the 8-inch shaft.

The gap is wider and the cost less than with oxy-acetylene, allowing for carbide and oxygen at fairly normal prices, respectively at 4d. per lb., and 4s. 6d. per 100 cubic feet, but in cutting the 8-inch diameter shaft the time is more than 3 times that with oxy-acetylene, and generally the oxygen cutter compares favorably in time, as oxygen, at high pressure, blows away the melted metal quickly. The carbons are taken at 4d. per foot long, and the current 1d. per unit.

In the hammered welds the edges are butted, and pieces of scrap steel of the same quality as in the parts to be welded are laid on to thicken the weld. These are fused in before hammering, and they protect the abutting edges from burning. It is therefore a natural sequence to think of a metallic electrode in place of the carbon, and with such metallic electrode other substances than iron or steel may be associated, and the Benardos specification mentions this fact.

Slavianoff, also a Russian, introduced about 1895, a metallic electrode in places of carbon. In 1893 the author suggested a mild steel electrode to the late Mr. Dickinson, of the Bowling Iron Co., and it was tried unsuccessfully. The experiment was not persevered with, or possibly a better result might have been attained. The author is not aware of any user of the Slavianoff system in this country, but understands it is in use in America, where the General Electric Co. have developed it to a considerable extent.

KJELBERG. — Oscar Kjelberg, of Gothenburg, introduced into England in 1907 a metallic electrode to replace carbon. He made the work negative to the electrode, so that the natural tendency would be to deposit the metal of the positive electrode on to the work. This system is largely and successfully used. The metal of the electrode is melted into the joint and then hammered. The metallic electrode is coated with a fusible silica flux, the object of which is to prevent oxidation and to insulate the electrode. The arc dissipates this flux, leaving no slag. The current is direct and varies according to circumstances

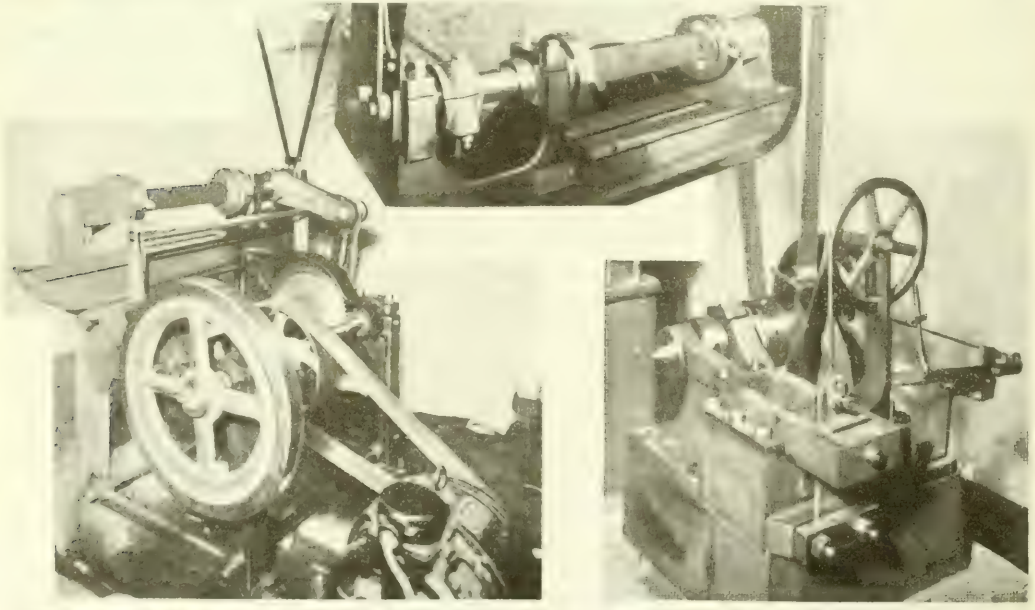
[illegible] The electrode [illegible] is made of carbon [illegible] supplied in lengths [illegible] the metal in welding, and so compensate for their loss. With some electrodes aluminum wire is incorporated under the coating. Blue asbestos yarn is especially [illegible] for welding iron or mild steel, as it forms a reducing flux, and it may be saturated with a composition such as sodium silicate, etc., or aluminum silicate, etc., to vary the fusing temperature of the yarn. Extreme care is used [illegible] much stress is laid upon the good and regular quality of the metal of which they are composed, and upon the exactness and evenness of the coating.

The metallic electrode is positive to the work, and, in fusing, is deposited upon it. The coating, in melting, forms a vitreous slag which covers the weld and flakes off more or less in cooling. The slag must be carefully removed if successive layers of weld are required. Its object is to protect the weld from absorbing oxygen, and so avoid deterioration of the quality of the metal in the weld. The metallic electrode fuses into a joint prepared by beveling the edges of the pieces to be welded. It is in almost direct contact with the metal to be welded, so that there is not properly an arc. The operation is otherwise very similar to that in the Kjelberg system, but there is no hammering. The electrodes vary from about 14 S.W.G. to 4 S.W.G. in diameter for ordinary work up to ½-inch thick.

This system appears to be best suited for thicknesses above 2-16-inch thick, though as in the Kjelberg process thinner metal can be welded. The speed of welding is relatively greater for the [illegible] [illegible] comparison with that of oxy-acetylene welds, but is much less than with the carbon electrode up to ¼-inch. The heat is, of course, very [illegible] as with the Kjelberg system [illegible] be carried over a large area. The current is direct, and the voltage recommended is about 100 volts, and much lower in amperes than with the Benardos system, varying from 20 to 150 amperes according to the thickness operated upon.

[illegible] is [illegible] with a metallic electrode by keeping the electrode from contact and maintaining an arc. The electrode melts away in the operation. If it touches the work it sticks to it. Occasional cooling by dipping the electrode in water is necessary. A carbon electrode is more easily manipulated for this purpose. With the metallic electrode positive to the work and deposited as it melts on the negative electrode, which is the work, welds can be made upward. That is to say the welder can work underneath the work and weld its under surface. This requires a particularly good workman. It can be done with other systems, but not so well, owing to the fact of the positive electrode depositing on the negative being a natural feature in an electric arc.

Many tests have been made both in the laboratory and in practical service with the systems described in the foregoing, and their utility has been fully demonstrated. The work, however, must be designed to suit the process, and the process must be regulated to suit the work, in order to be successful. Distortion due to the heat or the effect of contraction must be allowed for, especially on flat surfaces, and anyone requiring welded joints would do well to consult



LEFT MACHINE FOR TESTING FLAT BARS BY ALTERNATING STRESSES. TOP HEADSTOCK FOR ABOVE MACHINE. RIGHT MACHINE FOR COMBINED IMPACT AND BENDING TESTS

[illegible] before [illegible] duty de[illegible] [illegible] design.

Other Inventors

[illegible] many inventors [illegible] welding [illegible] Hago [illegible] in 1885, introduced [illegible] system with two [illegible] electric welding, and [illegible] the invention of [illegible] described in this paper. [illegible] so far as the author [illegible] L. Coffin, of Detroit, [illegible] reference of invention [illegible] are welding, as was also Henry Howard, of Halesowen.

C. H. A. Hoho and A. C. Lagrange, of [illegible] secured in 1892 an apparatus for heating metals to be welded. The metals to be heated are fixed to the [illegible] and immersed in an electrolytic [illegible] the current passes from the positive pole through the solution, such [illegible] of potash, and returns [illegible] piece attached to the negative pole. The solution decomposes, depositing hydrogen on the metal pieces in a thin layer. The metal pieces heat [illegible] of hydrogen protects them from the solution. The metal is withdrawn from the bath as soon as the proper temperature is attained and welded on an anvil. The metal pieces are perfectly clean and the hydrogen protects them to an extent from oxidation, but only until they are upset under the hammer. The process is interesting, but not in general use. The systems, in which welding is done by means of the electric arc, that are most generally used are the Benardos, The Kjelberg and the Quasi-[illegible] system.

All the systems so far described are operated by hand. The work is fixed either on an anvil, a suitable support, or as in the repairs of boilers, or other objects, by being heavy enough to remain stationary, and is connected to the electric circuit by an attached conductor. There are, however, and have been in the past in special cases, machines arranged to hold the work and to operate the electrode. These have not been found generally to produce better work or to weld more rapidly than can be done by a skilled welder by hand. Where they are successful is in special cases in which the work is of a straightforward nature, and the position and travel of the work or the electrode, the one in relation to the other can be maintained.

Electric Resistance or Contact Welding

This is the invention of Professor Elihu Thomson, of America. The author would like to correct a misstatement in his previous paper in which he referred to the resistance welding as the "Thomson-Houston" system. A letter was received from Professor Thomson [illegible] the report of [illegible], pointing out that Professor Houston was not associated with the invention. The author is not the only writer to fall into this error of nomenclature, and takes the first opportunity to publicly correct it. The earliest application of resistance welding [illegible] was that of causing currents of electricity to pass through the abutting ends of pieces of metal to be welded, thereby generating heat at the point of contact, which also becomes the point of greatest resistance, while at the same time sufficient pressure is applied to force the parts together.

Bars, angle, tee and other irregular sections are welded by this process, as are tubes, circular tires for cart-wheels, rims for the wheels of motor-cars, frames, wire-netting, chain, and mild steel wire down to very small dimensions. Copper wire is also welded. In welding the heavier sections it is customary in some cases to hammer them while they are in the jaws of the machine, as it is found in practice that some sections are thus more thoroughly brought together. If the heat shows unevenness of irregular distribution, the head of the hammer is sometimes used as an auxiliary conductor to bring more current from the jaw of the machine to the cooler portion of the metal under operation. The jaws are hollow and are cooled with water.

The parts or pieces to be welded are held in jaws as in a vice. One jaw is fixed and one adjustable, so that by moving the adjustable jaw the pieces may be brought into contact, and then after the current commences to heat and soften the metal at the point of contact of the pieces being welded, to press them together until the weld is complete throughout their mass. The adjustment of the movable jaw is in the simpler machine made by hand, in others it is automatic, and for heavy sections is done by hydraulic power. In some machines there is an automatic cut-out to switch off the current when the weld is complete. It is desirable to see that the pieces to be welded, if of equal section, project each to an equal extent beyond its respective jaw. In some cases gauges are provided to ensure accuracy.

In many cases the weld is finished off by hammering on an anvil or by mechanical means so as to remove the fin caused by the extrusion at the weld, and to toughen the joint and improve the quality of the metal in it. The current is single-phase alternating, and of very low voltage, being transformed down to about one to four volts at the electrodes, depending on the method of welding adopted.

There are two methods of electric resistance or contact welding, namely, slow and fast:

1. Slow welding, with a small electrical input and considerable time for application. By this method the metal is heated slowly, drawing it where required by tapping with a hammer to close contact and when welding heat is obtained, set up rapidly and finished on anvil. By this method the metal is not burnt and no rotten metal is hammered back into the weld. The current is one to two volts.

2. Fast welding. Heavy electrical input is used for a short period and the metal burned at the joint. The weld is closed up continually while burning occurs and after the circuit is broken, until all soft and rotten metal is squeezed out [illegible]. This is a method [illegible] depends on the nature of the contact of the jaws and may be anything between [illegible].

Tube Welding

The following examples may be of interest [illegible] the power required, and [illegible] of [illegible] welded:

Slow Method.—Tube welded 1⅞-inch diameter by 3-16-inch thick. Maximum input 30 kva. This tube was welded very slowly so as to do away with any thickening of the metal at the weld. These tubes are cut off quite square—originally they were cut off bevelled so as to avoid any contraction of the tube interior, but this was found to be unnecessary. On completion of the weld and while hot, the outside diameter is reduced by tongs closing on to and worked around the tube, gaps being cut in these tongs to allow the scale to come away freely. No hammering is done and no lump is left on the inside of the tube. These tubes stand a hydraulic test of 3,000 lb. square inch, and failures are less than 1 in 500.

Fast Method.—Where thickening at the weld is not detrimental, solid drawn steel tubes were welded in twenty-five seconds, with a maximum input of 34 kva., the diameter of the tube being 1⅜-inch outside by 3-16 inch thick.

Tire Welding

Slow Method.—Steel tire 2½-inch. Hard springy steel for gun-carriage wheels took 0.7 B.t.u. applied for fifty-eight seconds, maximum load 56 kva.

Fast Method.—Steel tire 3½-inch by ½-inch. Hard springy steel for gun-carriage wheels took approximately 0.9 B.t.u. applied for thirty seconds, maximum load 120 kva. There is no question that the welds are good, provided the conditions are right and proper care and skill employed.

To be continued

The Shipbuilding Outlook.—The shipbuilding question was up for discussion before the Union Government caucus in Ottawa recently. The members from districts where shipbuilding has become a thriving industry, pushed their claims for a continuation of building very hard. They say that Canada should have her own fleet carry her wheat to market, and that the number now being built will not be near enough for Canada's growing trade. The Government will be under a big handicap, owing to the contract made with the Dominion Steel Co. for plates at $81 a ton from the new mill, which will be in operation this fall. The Government realizes that this will make the cost prohibitive, but enthusiasts point to the mounting cost of construction in Great Britain as an incentive to keep on building here.



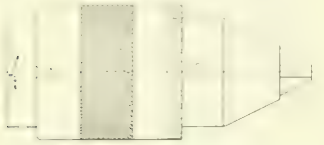
WHAT OUR READERS THINK AND DO



A QUICK METHOD FOR CENTERING CHUCK WORK

By J. J. McINTYRE

As no doubt readers of CANADIAN MACHINERY are always looking for something new, the writer illustrates by



SKETCH OF THE CHUCK

photograph and sketch what he believes a brand new stunt.

It is away from the usual method of centering work, which necessitates the removal of the tailstock centre, and is much faster and easier to operate.

Referring first to the sketch, readers will notice that the scheme is very simple, namely, to take an ordinary small drill chuck and provide a hole in the back of same with an included angle of 60 degrees, which is, of course, equal to the angle on the tailstock centre.

The rest of the operation is self-apparent, but for readers' benefit we show the photograph of the chuck in place on the lathe, and actual operation.

(Editor's Note.—We would like to hear from readers as to their opinion on this style of chuck.

CURVED HACK SAW BLADE

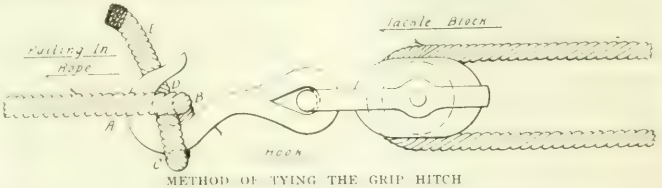
According to the "Machine and Tool Review," published by Albert Herbert Ltd., of Coventry, England, a new patent has been secured for a curved saw blade for use in the hack saw. It is claimed by the inventor that only a few teeth are cutting on alternate parts of the surface at one time, and an increased output of 25 per cent. is expected by the use of such a style of blade.

HOW TO TIE A GRIP-HITCH

By L. A. Latuou

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When drawing on a pulling-in line with a set of tackle blocks it is often necessary, as the pulling proceeds, to catch the pulling line with the hook on the tackle block at various locations along its length. This may be readily and quickly effected by forming the hitch shown in Fig. 1 in the tackle-block hook. To make this hitch, the pulling-in rope is passed through the hook at B, under it at C, and the free end E is passed through the loop at D. When a stress is imposed on A the loop B grips against D. Obviously, the greater the stress the tighter will be the grip. The use of this hitch renders unnecessary the use of knots for permanent fastenings.

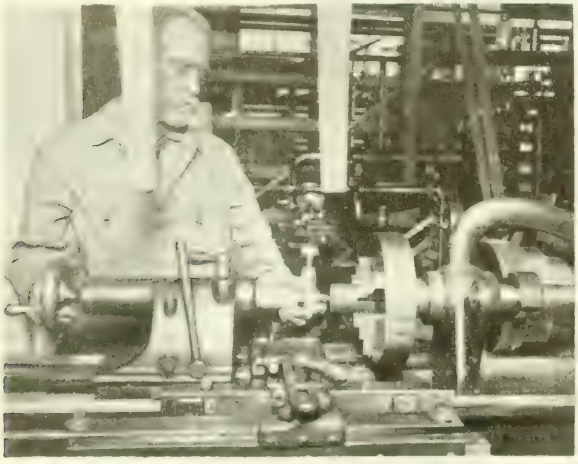


METHOD OF TYING THE GRIP HITCH

PROVIDING OIL GROOVES IN BABBITT BEARING*

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If a piece of shafting around which babbitt bearings are being poured is wrapped with a cord as shown in the attached picture before the bearing is cast, oil grooves are provided. The cord should be wrapped spirally in two sections from the centre of the bearing toward the ends, so that the oil will be



GENERAL VIEW OF THE MACHINE

SURFACE-GAUGE NEEDLE WITH ECCENTRIC POINT

A SIMPLE dodge for securing a fine adjustment to the needle of a surface-gauge, when the latter is unprovided with a fine height adjustment, is to grind the point to one side (see the sketch), so that when the needle is turned a portion of a revolution in its clamp, the point is raised or lowered, as the case may be. This is preferable to tapping the needle to drive it up or down.—FRED HORNER.

[illegible] direction from the oil hole [illegible] as it revolves.

TURRET LATHE STUNT

By C. E. HALL.

In the production of small brass parts on a "Cataract" No. 3 bench turret lathe with automatic chuck closer, much inconvenience was caused and valuable time

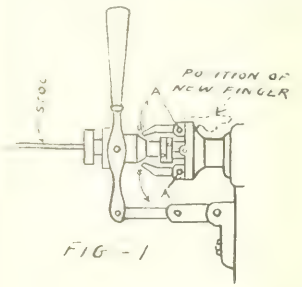


FIG - 1



FIG. -2

lost, by the chuck failing to open when the clutch was released.

The angle of the draw in chucks on a No. 3 "Cataract" is 12 degrees, and while it is undoubtedly a better angle than most others as far as holding and easy closing are concerned, still it will not release as readily as one having a greater angle, which in most standard makes is 15 or 20 degrees.

The trouble was caused by the clutch fingers.

As will be seen in Fig. 1 they are both pivoted at A.A. and as the whole clutch revolves, the centrifugal force causes the outer ends to travel in the direction of the arrows Fig. 1, consequently closing the chuck enough to prevent the stock, which is fed automatically, from feeding freely.

The difficulty was overcome by making a pair of tool-steel fingers, hardened on their working faces, of the design shown in Fig. 2, which put the preponderance of weight on the opposite end of the pivotal point and so tended to open the chuck. The irregular outline was merely to conform to the shape of the clutch body, and give a maximum weight of metal on this end of finger.

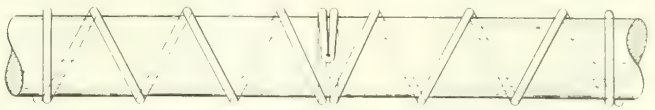


FIG. 1 USING A SPIRAL CORD TO CAST OIL GROOVES IN BEARING

U. S. PIG IRON FINDING IT HARD TO GET INTO THE BRITISH MARKET

ALTHOUGH prices have advanced abroad, high freight rates are against American material. Trading is very dull, and some concessions are being made in spots.

Following are reports from various centres:

New York.—Sales during the past week have been confined to small lots for prompt shipment. These have all been of the foundry grade, and the total is not more than 3,000 tons. The new prices announced in Great Britain have placed American iron at a great disadvantage, not only on account of actual lower prices, but the difference between the freight rates over and above the cost at shipping points. With further cuts expected in the British prices, a still greater handicap will be placed on American material.

Philadelphia.—There has not been much business done during the past week, but enquiry has been brisk. The situation seems to be that large consumers are waiting to make sure that the bottom has been reached before placing their orders. An export enquiry for 2,000 tons was lost to an English maker by a margin of over $9.

Pittsburgh.—The lowering of production that has taken place during the past weeks is beginning to show some effect in the pig iron market. Some producers have stopped production entirely, and are supplying what demand there is from stock. Sale of 500 ton Bessemer to Pittsburgh at $27.95 is noted.

Buffalo.—There is no sign of normal buying being renewed. Both inquiry and sales are at a minimum. Producers are operating at only 40% to 60% of capacity. The largest sale reported is 250 tons malleable.

Cleveland.—With iron still accumulating on banks, blowing out of furnaces at an early date is considered likely. Most of the producers in this district have revised their old contracts to the $26.75 furnace for No. 2 foundry iron. Sales have been confined to carload lots.

Chicago.—With production still at a low level, more stacks will likely be blown out before long. There is a fair amount of inquiry for small lots for immediate delivery, and a number of small sales have produced a fair aggregate. A good buying movement cannot be long delayed.

Cincinnati.—Small lots for delivery before July 1st constitute the total business. There have been reports of medium sized sales for third quarter, but no information as to the prices quoted are available.

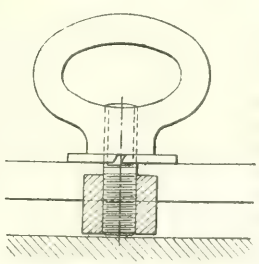
St. Louis.—The condition here is one of absolute deadness. No orders are being placed, and more stacks are being blown out. A return of open markets and competition is ardently wished for.

Birmingham.—The largest orders that are being placed are an occasional 300 tons to 500 tons. Stocks have been accumulating, and production has been less, but there is no report of any further cutting out of stacks.

Special Cable From Birmingham, Eng.

Prominent representatives of American mills are visiting England and France, promoting an international agreement in the export steel trade. Other leading American producers are expected to arrive here for a conference in June. A pooling and international price agreement on rails is being consummated. English import restrictions on machine tools, woodworking machinery and agricultural implements were removed April 24.

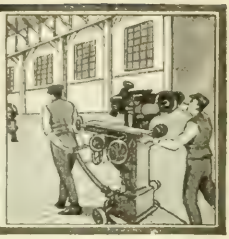
LIFTING-EYE FOR SLOTTED TABLES.



THE illustration shows a loop nut, fitted with a screwed stud, entering into a shouldered nut that fits the tee-slot of a machine table. A pair of these eyes, spread sufficiently apart along the slot, form a convenient means of lifting the table by hand, or rope to the crane, when doing fitting, or repairs. A split spring washer under the boss of the eye forms a sort of friction lock to prevent the stud sliding along should the eye be turned inadvertently. FRED. HORNER.



DEVELOPMENTS IN SHOP EQUIPMENT



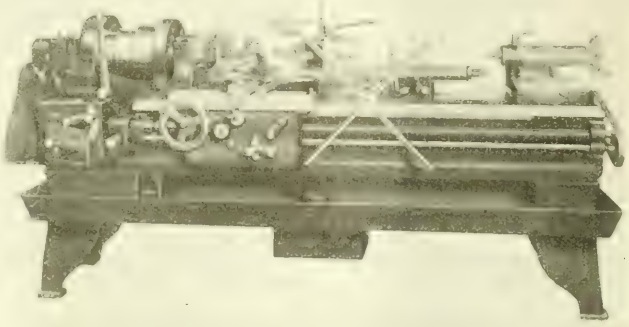
CINCINNATI TURRET ATTACHMENT

The [illegible] as shown, [illegible] readers a good idea of the new attachment that has just been placed on the market by the Cincinnati Lathe and Tool Co., Cincinnati, Ohio, for use in connection with its regular line of engine lathes. This hectagonal turret is designed for various types of work, and is shown in the photographs on various types of work. The lathe shown is supplied with a pan, a pump, a turret toolholder in compound rest, double back gears, and hexagonal turret on the bed, together with power feed.

NEW 11-IN. SWING "STAR" QUICK CHANGE ENGINE LATHE

The Seneca Falls Manufacturing Company, Inc., has just brought out an addition to the well-known line of "Star" lathes, an 11-in. swing quick change gear engine lathe.

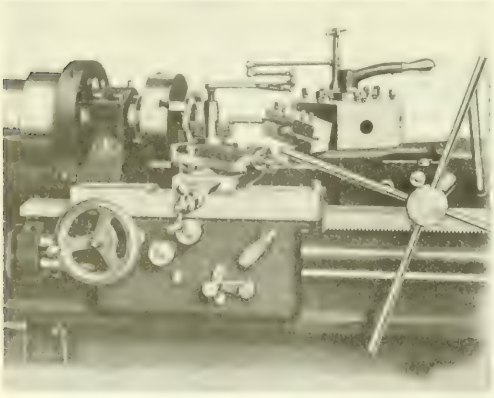
This lathe has a quick change gear equipment, consisting of a train of nine gears in the form of a cone mounted on the lead screw, the whole being enclosed in the main gear box and controlled by one tumbler handle. By means of another tumbler carrying a set of compounding gears, the train of gears is given different speeds, thus providing 45 different changes of feeds and threads, from 3 to 96, including 11½, none being duplicates. Any desired thread not given on index plate may be obtained by using necessary change gears on feed stud. The construction is very simple and the drive is direct through a minimum number of gears from head spindle to lead screw, absorbing practically no more power than a plain engine lathe.

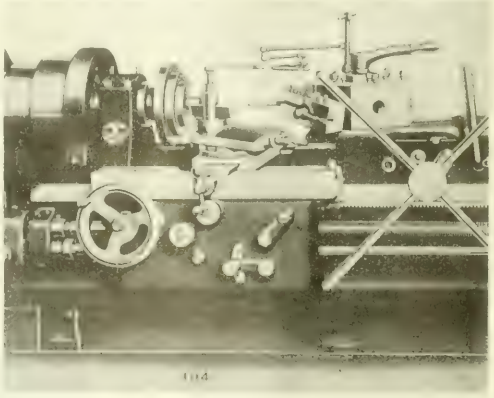


GENERAL VIEW OF MACHINE

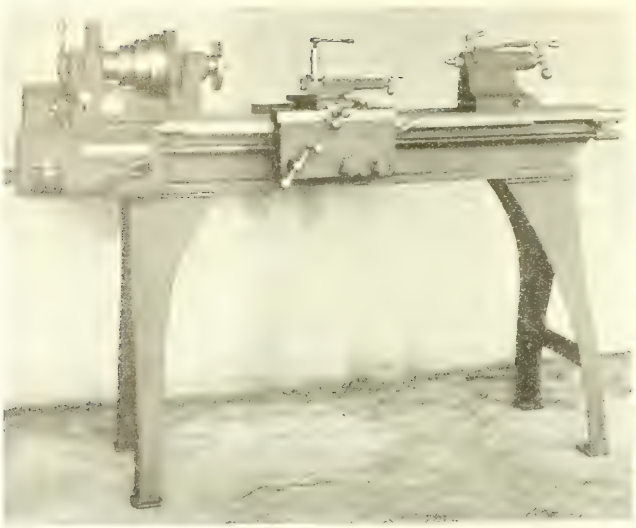
The headstock is web pattern, hollow spindle with 1-in. hole made from 60-65 carbon crucible steel carefully fitted to bearings. The carriage has substantial bearings on ways, is gibbed front and rear, and has power cross feed. The apron has a safety device so that opposing feeds, the long feed and split nut cannot be engaged at the same time.

This lathe may be used with any of the large line of extra attachments, including motor drive, taper attachment, draw-in chuck, oil pan and pump, turret carriage stops, milling and gear cutting attachments, etc.





CLOSE UP VIEWS OF THE TURRET



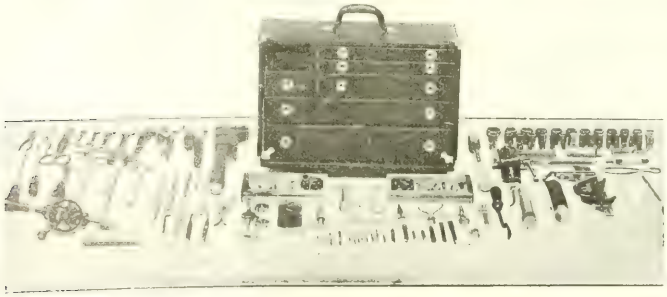
NEW TOOL CHEST

The Union Tool Chest Company, Rochester, New York, have recently developed a new tool chest for the use of the auto mechanic, auto and truck owner. It is strictly a garage chest. The material of which these chests are made is selected, thoroughly kiln-dried oak throughout. The corners have lock and glued joints. This is the construction specified by the Government for all its machine gun, cartridge belt boxes and chests which are subjected to extremely rough handling. The outside finish is obtained by means of an ebony stain, black filler, black first coats, and two coats of black varnish. This produces a high-grade, semi-gloss black finish which is oil and water proof. It will not show finger prints and can be easily and quickly cleaned. The inside of the frame and the inside of all drawers and trays is finished black with a special oil and waterproof preparation. The drawer pulls are of a special flush ring type, which are as convenient and give 10 per cent. more drawer space than knob pulls. The rings are flush with the drawer fronts and cannot pull off.

A Sargent and Greenleaf brass lock is provided. The handle is covered with heavy genuine leather and has heavy steel wire through the centre. Loops secured by rivets, not screws, carry the [illegible] and cover the end of the handles which are attached to the chest.

The drawers run in hardwood slides inset into the ends of the frame. These will carry any weight which can be put into the drawers.

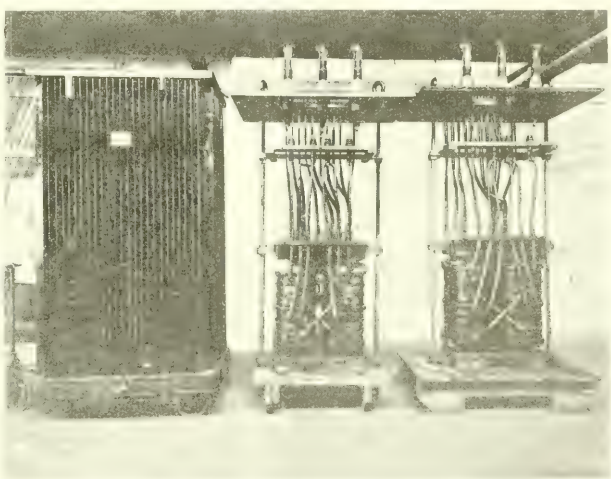
In addition to its ample capacity this [illegible] chest is conveniently arranged for [illegible] with movable partitions for small parts and for delicate instruments, such as battery gauges, etc. The third drawer from the top is designed to hold a complete set of socket wrenches.



ELECTRIC FURNACE TRANSFORMERS

The electric furnace owes its growing acceptance as a desirable medium, both for heat treating steel and melting non-ferrous metals, chiefly to the more exacting control that is offers over furnace conditions. To supply an important link in the control equipment of its Baily electric furnaces, the Electric Furnace Company, Alliance, Ohio, is building special transformers of the type illustrated.

These core type transformers are of 400 K.V.A. capacity and the high tension side fitted with the usual voltage taps, is wound for 22,000 volts. The



low tension side is fitted with the special voltage taps to meet the particular voltage requirements of the furnace. Each transformer is single phase, and for small furnaces, requiring 100 K.W. or less, one transformer is sufficient. Three phase current is taken care of by two transformers fitted with a Scott connection. By means of the special low tension voltage taps, any desired current input may be delivered to the furnace through the selective oil break switches that are a part of each installation. With furnace current under control, any furnace temperatures may be steadily maintained.

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The Unsettled Conditions

THE authorities of our cities, of our provinces, and of our Dominion, should take heed to draw a straight line between legitimate trade unionism and the continental Bolshevism that certain agitators are seeking to foist on the world to-day.

Trade unionists themselves have got to make it their business to use every bit of influence they possess to see to it that they are not made a party to a lot of baneful influences being turned loose here that will make it well nigh impossible for the shops to operate at all.

There is no room in Canada for Bolshevism. There is not the disease here to call for such a poisonous remedy. Conditions that drove crowds to mob rule in Russia are not here, and when men call out in this fair land and urge others to rise up and use the torch and the gun, it is high time for our organized law to do a fair share of the rising up and put an end to this stuff.

There is another duty facing the Government. It is safe to say that most of the unrest right now is due to the fact that men's wages, though they have increased, have not kept pace with the rate at which the purchasing power of their dollars has decreased. There is a gap between income and outlay that they are not able to meet.

We have little patience with the talk that people have money to go to the moving pictures, therefore, they are not in bad shape. Surely no person has a desire to see income and expenses so closely balanced that there must be nothing left over for recreation or pleasure.

What the people want to feel is that every dollar they spend for the things they must have in order to live decently shall represent **real value.**

What they do **not** want to feel is that 67 or 70 cents a pound for butter represents not only its first cost in labor, but a certain amount of rake-off for every man who has been able to crowd himself into the line between the producer and the consumer.

Butter is only one of a long list of staple articles.

The cold storage business should be investigated thoroughly and fearlessly, and the public should know if it is true that tons of food are destroyed at intervals rather than that they should be allowed to go on the market at a reduced price.

The business of grappling with this problem is big enough to take up the best efforts and attention of any Government. There is a real task there, and in its solution rests much of the future conditions in this country.

We can never have a contented and a happy people until it is possible for them, out of their earnings, to buy from the markets of the world those things which they must have to provide decently for themselves and their families. As things stand at present, those who are unduly profiting in **handling, making** or **holding** the things people must buy in order to live are making it almost impossible for manufacturing business to go ahead and do business on a profitable basis.

Plain, Ordinary Thrift

ONLY a week or so ago the United States Steel Corporation announced that it would, for the present at least, suspend payment of the extra dividend that has been handed out to the shareholders recently in addition to the regular payments.

As far as we have noticed it has not been suggested that the action of the Steel Corporation was prompted by the fact that they could not meet the extra dividend. As a matter of fact the Steel Corporation could meet the payment, and do it handily. They have made money They have very large assets, and nothing would be thrown out of kilter were the "extra" to be paid as usual.

The corporation's president says that he looks for better business on ahead. During the present period he intimates that unrest and slack orders are to be expected. And for that reason he seeks to set his house in order. In other words there is room for ordinary thrift and precaution in a concern the size of the United States Steel Corporation.

As a general thing thrift and precaution are supposed to be part and parcel of the existence of the man with a fairly small salary. He, of necessity, has to be tolerably thrifty, else some fine day he will find himself in jail or in the hands of the creditors.

But the man who is making money is he who finds that even with his big ideas and fool habits he is able to make ends meet. He is more mightily concerned about thrift in some other chap's case than he is in his own.

It's easy to let a dollar slide now, isn't it? A few years ago the expenditure of a five dollar bill would have meant that you and the wife would have had to sit up for a couple of evenings and talk the matter over. But now? Well, it goes and there is nothing more said about it.

Cost of living has increased. Granted. Wages have gone up? Yes. But along with it all, our ability to spend has kept ahead of the whole thing.

A glance at the stock markets generally and at the offerings of debentures leads to the belief that we are moving out of the era of the high earning power of money. We are passing out of the unreal atmosphere of war industry, and it is hard to realize it. Business that is placed now or orders that are given are for normal, not abnormal purposes, and sooner or later we will have to realize this. The element of urgency has been removed, and people are more inclined to stay out of the market with their business if the price of materials does not suit them.

The wise man is going to govern himself accordingly. He is not going to put the lid on all expenditures, but he is going to buy ESSENTIALS and let the trash slide. He is going to take a leaf from the book of the Steel Corporation, and thrift and common sense are going to have a chance to assert themselves.

OPPORCHUNITY

"As the pote says,
Opporchunity knocks at ivry man's dure wanst.
On some men's dures it hammers
Till it breaks down the dure
An' thin it goes in and wakes him up
If he's asleep,
An' every afterward it wurruks f'r him
As a nightwatchman.
On other men's dures it knocks
An' runs away,
An' on the dures iv some men it knocks
An' whin they come out
It hits thim over the head with an axe.
But ivrywan has an opporchunity.

Well This Sounds Like Real Easy Money

Written by One Who Had It Tossed at Him

LOOKING over CANADIAN MACHINERY a couple of weeks ago, I saw an article headed "Is There Such a Thing As Easy Money?" That is, in the nature of things, a highly controversial subject, and complicated by the fact that the ones who get their money in the easiest manner, think it is obtained only with difficulty.

Personally, the pursuit of the elusive dollar has always been fraught with hard labor and indifferent success. Only one occasion comes to my mind wherein I was the hunted, and the prettily engraved paper, the pursuer. Even at that, the manner of its coming was attended with so much mystery and anxiety of mind, that I doubt if it could be strictly labelled as "easy money."

The means by which I was, at that time, endeavoring to lay the foundations of a fortune, was by taking charge of the steam plant of a manufacturing concern. The salary was in inverse proportions to the duties. This particular plant had started in a modest way some years before, the motive power at the beginning consisting of a vertical firebox boiler, and a 15 h.p. horizontal engine. The original engineer had been a bricklayer, who having developed a partiality for hanging around the boiler, during the construction period, in order to warm himself, was struck by the comparatively easy and sheltered life the fireman seemed to lead. It looked so much more comfortable than laying bricks in the invigorating winter climate, that he determined to change his profession. Fortune favored him, inasmuch as the incumbent of the position developed an attack of the demon rum, and was summarily discharged. The erstwhile follower of the ancient rites applied for the position, and obtained it.

The product of the factory was a household need. With the growing population of the country the demand for the company's goods increased. The plant grew, more power was necessary, and a horizontal boiler took the place of the vertical, a new boiler room being built to house it. More buildings came along, more pipings, more boilers, more power. With the help of the handy man who had become the chief steamfitter, pipes were run here and there and everywhere. With the introduction of motors instead of the old line shaft drive, an electrician became necessary. Old Bill, the one-time bricklayer, kept strictly aloof from this phase of the proceedings. He was already in the position of the Irish Fusilier crossing the Tugela River in the Boer War. The commanding officer, during the fording of the stream, gave the order "Fall in two deep." One of his followers replied in anguished tones, "Begorra, I'm in two deep already."

Things were getting so complicated for Bill, that he decided to find an easier job. Before long he got in touch with a nice little factory that used one boiler for heating only, and transferred his patiently won engineering abilities to this haven of rest. This was where I stepped in.

I was at that time in a big plant out in the country, but yearned for a city life. Some friends of mine in the supply business were looking out for a job for me, and one day I got a letter from them, advising me that some clients of theirs had a nice little plant they wanted a man for, who could do a little re-organizing. After a little correspondence, I accepted the position, and moved in to the city.

I found a plant, consisting of four 150 h.p. horizontal return tube boilers, a pair of compound engines, horizontal, air compressor, belt-driven generators, hydraulic pump, and the old original engine, which was used occasionally at nights.

In the boiler room was the most astounding collection of pipes it has ever been my misfortune to run up against. They ran overhead, under the floor, were mounted row upon row on the walls. The main steam pipe was a fearful and wonderful layout, and a graceful wreath of steam surrounded every joint. While I was standing on the boiler top, trying to visualize this Chinese puzzle, a wildly excited old fellow rushed up the ladder, and started shutting down the main stop valves on all four boilers. Naturally all the safety valves started to blow, and the boiler tops become a most uncomfortable location. The boilers were in the basement, and there was a door leading from the tops to the yard, so I strolled gracefully out to wait for the excitement to stop. I hadn't yet taken charge, and my enthusiasm was beginning to cool a little.

While I was trying to decide on whether I should go home or not, the superintendent came along. He had left me just a few minutes before, to allow me to look around a little. He looked worried. "I thought you were in the boiler room," he barked when he saw me. "Well, I was," I replied, "but there seems to be a holiday proclaimed, and I didn't want to interfere. Does this sort of thing occur very frequently, or is it just emergency practice?"

"Well, this is what we want to stop. All this trouble is over a burst pipe in the galvanizing department. There's so many pipes and valves leading there that no one knows what to shut off, and the quickest way is to shut everything off, plug the pipe, and trace it after."

That was my introduction. However, I liked the super, and was promised very many inducements if I would stay and straighten things out. I staved, and in a few months had things improved a lot. Incidentally, I had a lot of trouble with some of the oldtimers, especially a night fireman, an Italian. It ended up with my firing him, and he departed, vowing vengeance.

Christmas was approaching, and I was getting over the worst of my troubles. I didn't have to work more than an average of fourteen hours a day, and sometimes even got a Sunday at home. I had been married a short time, and was getting quite well acquainted with my wife, in the intervals between supper and bed.

One day, I was called to the 'phone. A strange voice came over the wire. "Is that Mr.——?" it demanded. I pleaded guilty. "You are chief engineer there?" Again I admitted the soft impeachment. "That's alright. Now what is your private address?"

I immediately became dignified. "I don't know you, sir, and I don't give my address to strangers. Who are you, and what do you want." Mystery pervaded the voice. "You'll find out who I am in good time. I can't tell you over the 'phone." "Very well then," I replied, "it's no use prolonging the conversation."

I hung up the receiver, and tried to forget all about it, but I kept on wondering. It seemed peculiar.

Foolishly, I told my wife about it after supper that night. To my surprise, she immediately dissolved into tears. "Oh dear, oh dear, I knew something awful would happen. Why did you do it?" Not knowing what I had done, I couldn't explain, so said nothing. "Don't you see," she went on, "it's that dreadful Italian. The papers are full of dynamite outrages. We'll be blown up in our sleep, I know we will."

This angle hadn't occurred to me. It seemed funny to me, and I was foolish enough to laugh. I got the blowing up right there, and incidentally, determined to keep business affairs to myself in future. However, peace settled down after a while, and nothing more was said, though she was plainly worried.

Two days after came the call again. This time I had a new idea. "Look here, old chap," I said to the unknown. "I have all the life insurance I can carry, so it's no use your bothering." The owner of the voice laughed. "I am

not selling life insurance, but I'm glad to know you carry it." There was something about this I didn't like. I tried a new tack. "Why don't you come down here and see me?" I demanded. "Oh, that wouldn't do. It's better for my own sake to see you at your house." "Well, you can jolly well find out," I yelled. "I'll never tell you." He laughed again. "I just called you up to let you know I've found out. You'll see me on Christmas Eve," and the receiver was hung up at his end.

Christmas Eve was only two days off. I did a lot of powerful thinking during that time, though I didn't say any more to my wife. I could think of no solution. I didn't owe any money to anyone, and had no enemies, with the possible exception of my late fireman. There seemed nothing to do but wait.

We were going out that night, and though I was not to be scared, I was sort of hurrying my wife up while she dressed. She seemed to be longer than usual, but the last time I looked in she had said she couldn't be any quicker, and I was making her nervous. I thought to myself, that was quite fair, as I was nervous myself.

A short, sharp ring at the door bell. I jumped about a foot, and then, pulling myself together, boldly opened the [illegible] there. "You are Mr. ——" he asked, and immediately I recognized the mysterious voice of the telephone. I nodded without answering.

"You have given me a lot of trouble to find you," he went on. "Can I speak to you a minute." I sized him up, and concluded I could handle him alright. "Very well, come in," I answered, and led him in to my modest sitting room.

"My name is Brown," he said as he took a chair. "I represent the —— Oil Co. I have been months trying to sell your firm, and shortly after you took charge, I got an order. Here is a little Christmas present," and he laid a ten dollar bill on the table.

I tried to protest. "Not a word," he broke in. "This is entirely between you and me. I wish you a very merry Christmas." Before I could frame the words I wanted to speak to him, he had reached the door, and was half way down the steps. I concluded to let him go, and returned to the room, to enjoy the heartiest laugh I had enjoyed for some days.

My wife came out to enquire into the cause of my mirth. I told her I was laughing at a man for giving me ten dollars. "Of course," she said, "ten dollars is only a joke to you. What was it for?" "Well, my dear, it was supposed to be for value received." I explained what my visitor had said to me. "The whole point is this. I had no more to do with purchasing oil or any other supplies than you have. Our firm divides its orders among the people who buy from them, and no matter what the quality, they each get a turn. Anything I say for or against carries no weight. As a matter of fact, this chap has the worst brand of oil on the market, and he knows it. That's why he feels so grateful to me, for what he thinks is my good influence. It would be a shame to undeceive him. The reason he got an order is because his people bought some stuff from our firm, and as long as they continue to buy from us, he will get more orders, and we will get a visit from Santa Claus."

Well, the following Christmas, I received two ten dollar bills, and the one after that, on the last occasion I showed my friend a case of cutlery the boys had given me that day on the occasion of my leaving the firm.

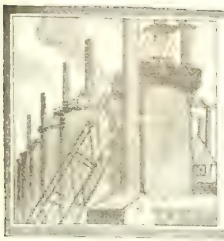
"Well," he said, "I am sorry you are leaving. I hope you will put in a good word for me with your successor."

I promised.

Current Events in Photograph



One of the chief ambitions in life of the Bolsheviki seems to be to wreck and murder. This junk pile shows how costly locomotives were deliberately wrecked. The men on guard are British bluejackets and the scene is at Soroka, on the Murmansk-Archangel Railway. This wreckage is a very mild sample of what usually happens when the Bolsheviki are in charge of things.



MARKET DEVELOPMENTS



Much War Material to be Disposed of Yet

And Tool Dealers Want to Know What is Going to be Done With It—Rate of Production at the Steel Mills Does Not Improve—Scrap Market as Dull as Ever

DEALERS [illegible] who are selling lines of American-made machine tools find that the rate of exchange on Canadian payments is having some effect on the sales. It amounts to around 2¾ per cent., and when the dealers are not able to fasten this on the purchaser it cuts seriously into his margin on the sale. The exchange serves also to give the Canadian maker an advantage of that amount over his American competitor.

The large amount of used machine tools in United States war shops is also an unsettling element in the market. The surface has hardly been scratched as far as the other side of the line is concerned when it comes to disposing of this material, as there are immense plants from which hardly anything has been taken. Builders of new machinery would like to know for certain just what is going to be done with this.

Production at the steel mills does not improve, although some of the dealers state that there has been some signs of an improvement in the movement of structurals. Anything, large or small, that turns up in this line, could well be called an improvement, as there has been a standstill of the most pronounced sort for a great many months.

Pittsburgh places the rate of production at the steel mills in that district at 60 per cent., with a tendency to fall below this mark. It is also noted that the railroads, which were spoken of at one time as likely to be large buyers of rails, are well up with their orders. In fact, it is claimed that they have already had rolled for them their normal tonnage, and so the much-talked-of controversy between the Department of Commerce of U.S. and the director-general of the railroads amounts to nothing at all. In the last resort the railroads could turn around and say that they had no business to place, anyhow.

The scrap metal market continues dull—as dull as it has been at any time since the signing of the armistice. In fact, it is quite proper to refer to it as dull, listless or stagnant, depending on your preference for words.

No changes have been made during the week, either in steel or iron or the scrap metals. The only notable tendency is that dealers who are now making inquiries for fourth quarter copper find that the feeling is for a higher level at that time

MONTREAL RECOVERING FROM THE STRIKES THAT WERE ON THERE

Special to CANADIAN MACHINERY

MONTREAL, Que., May 8.—Business has again steadied down after a brief period of disorganization, due to strikes, and while other disturbances are [illegible] is over. Montreal will take on additional activity in the near future, when the improvements to the harbor are well under way. Little has been done in this way during the war [illegible] the present year is of considerable importance. Traffic in and out of the port is taking on midsummer activity with ocean vessels arriving daily. General business is improving slowly, with reports steadily becoming more optimistic. Steel trade is better; machine tools are not active but dealers report a fair volume of business, new equipment demand steadily growing. Metals are quiet and dull with little interest displayed. Scrap is still dull with little movement.

Business Gradually Improving

Current business in the steel industry is not what might be termed exceptionally active but the volume is sufficient to taboo the possibility of calling the market stagnant. Considerable delay is experienced in getting down to operations on a peace basis, and many reasons are advanced for this apparent hedging, but the one most generally heard is the uncertainty of the future. Three years ago it was the same uncertainty of the future that maintained every industry at the apex of activity, but the want of confidence is a feature of present conditions.

Canadian manufacturers are beginning to realize that time will be required to normalize the industrial situation, and that pre-war prices cannot be attained by simply waiting for them.

The steel business here has been somewhat stimulated by the opening of navigation and considerable movement of material is reported. Dealers are reporting better warehouse supplies but are still reluctant to carry the stock that was generally shown in pre-war days. No change has been made in prices here, and quotations are invariably firm in character.

Metals Very Quiet

With the absence of any marked activity the market continues to remain in its state of listless unconcern, and apart from buying for present needs, which are relatively light, the situation is devoid of interest. With the exception of aluminum, all the metals are inclined to weakness, but apparently nothing can [illegible] in face of the uncertainty that appears to permeate [illegible] dustry. The presence of labor troubles and the possibility of others is likewise an influencing factor and one that has an unknown relation to the existing state of dormant enterprise. Business here, in metals, is very quiet, but what is passing is of a steady character. Dealers are quoting easier prices on [illegible]

...for lake, 17½c for electro, and 17c for casting; these quotations represent ... declines of from ½c to 1c per pound ... the above shows a drop of 6c over that previously quoted, but business is quite dull. Spelter is virtually dead and has dropped from 9c to 8c per pound. The demand for lead is exceptionally light and the quotation of 6½c is a decline of ¼c per pound. Aluminum is holding firm and ton lots may be purchased at 35c per pound but the price of 38c holds for small quantities.

No Export Trade in Scrap

Trading in old material is far from active and the market is quite listless with dealers apparently taking little interest in the situation. Buying is of a transient character as consumers are invariably content to purchase just enough material to satisfy their immediate requirements, leaving the future to look out for itself. Dealers are not anxious to take on any more stock as their yards are now well filled, as the price is little inducement for the accumulation of available material. The general unsettled conditions are a factor in the quiet trading. The recent war has altered trade routes for many commodities, including old material. Prior to the war the opening of navigation meant increased activity in this respect, but this year the reverse is the rule. "Before the war," stated one local dealer, "we shipped large quantities of scrap to the Old Country, but it would appear that the market there is amply supplied, and in consequence the demand from that source is entirely eliminated for the time being." Some local business is being carried on but prices are relatively unchanged but of a nominal character.

ARE SATISFIED TO LEAVE LISTS ALONE

Toronto Dealers Report That Market Is Rather Dull During the Week—Exchange Rate Hurts

TORONTO.—For the second week in succession dealers in all lines covered by the markets are satisfied to let prices stand as they are, and no changes are noted this week. There is a general attitude of waiting developing, and until the trade gets over it there is not likely to be a great volume of business moving. The strike, if it lasts for any length of time, is bound to have the effect, and already the buying of basic feet of putting the brakes on trade lomaterials in some of the plants affected has been very noticeably decreased.

Prices are Holding

Dealers in steel claim that there are going to be no drops for some time. They do not take much stock in the rumors from U.S. points that prices are going to tumble in June. There are signs of a movement in structurals, the first for some time. The inquiries are coming in from various sources and some business is being placed in small lots. The trade does not care very much whether this is small or great, so long as the movement gets a start. There is a feeling that a movement in structurals will give greater confidence in other lines, which have been holding back in the meantime.

Some of the warehouses have been doing a good business right through this year. In fact one of the firms stated to CANADIAN MACHINERY that the trade during that period in their lines was all they could desire, but they were not so hopeful for the present month.

There is some buying going on by a local concern on account of business that is being done for the Halifax shipyards, which are still working on Government boats. Although there are some good orders like this coming in this firm contended that general business was duller than it had been for some weeks.

One good-sized shipment of iron lapwelded tubes is coming in from an Old Country firm for a Great Lakes shipbuilding concern. English furnaces are also being put in. Some of the importers look for a lower price in many of the British lines as soon as the actual signing of peace has taken place, and the business of dismantling the war shops has been proceeded with. The claim of these firms is that the advantage that American firms have now in the way of price in competing for business in the Canadian market is but a temporary condition, and it will be squared away as soon as the Old Country firms get back to their old lines.

Don't Like the Discount

Some of the firms that are selling American machinery in Canada find that the discount that is against Canadian currency just now is rather a serious affair. In some cases, now that competition is pretty keen, it is necessary that the price of the machine be brought down to a point where there is just enough profit to keep the things moving. The discount amounts to about 2¾ per cent. Many of the sales are made on a flat ten per cent. to the agents here, and when it is found that the consumer will not pay the exchange, if he has to foot for the discount, finds himself out on the deal. Some of the Government purchasing departments, such as the National Railways, are also showing a strong preference to staying on this side of the line with their buying, as a matter of national policy, as they do not feel that the Government should, with the exchange so pronounced against this country, make purchases that will tend to increase it. In fact there are some who actually look to see a three per cent. exchange, which will mean just that much protection to the material that is manufactured in the Dominion.

Dealers differ as to the amount of business that is being done just now. In some of the offices the statement is made that the month of May will be a poor one, while in others they state positively that they are well pleased with the amount of business they are doing.

Scrap Market Dead

One can use the word dead, stagnant or dull in referring to the condition of the scrap metal market, according to the way he feels. In all three cases the chances are that he will be well within the mark. Dealers state that there has not been a good week's business done since the signing of the armistice. There is nothing, they claim, on the horizon to stimulate speculative buying, and neither foundries nor steel mills want anything now. "Business is as poor right now as it has been at any time since the ending of the war," was the way in which one of the largest dealers sized up the situation to CANADIAN MACHINERY, and he was not particularly hopeful of anything better in the immediate future. The drops in the price of pig iron made no difference at all in the demand for scrap for a mixture.

It is known, though, that some of the dealers in the metal markets are trying

POINTS IN WEEK'S MARKETING NOTES

It can be said that there is an open market in pig iron now, and active bargaining takes place whenever there is a sufficient tonnage to warrant it.

Scrap metal market in Toronto is in the same stagnant position that has existed since the signing of the armistice. Sales made are few and of little consequence.

The U. S. Department of Justice, contrary to the general belief, did not sanction the price fixing movement which culminated in the schedule of March 21.

U. S. railroads are not making enough money to buy in a supply of rails in advance. They got a little over their normal supply in the year 1918.

Some of the dealers who are trying to get a line on supplies of fourth quarter copper, claim that the price is going to be higher than at present.

Once British industries get on a peace basis, it is claimed they will soon put their material on the markets here at a price that will sell under the American figures.

The rate of discount on Canadian payments for U. S. machines, which now amounts to something like 2¾ per cent., is interfering with the sale of U. S. machine tools in the Canadian market.

Production at U. S. steel mills are now placed at 60 per cent. of capacity, and the rate is still declining.

now to secure deliveries of fourth quarter copper, and they are not finding it an easy matter to do this. They seem to be certain that for the months of October, November and December, copper will be expensive. This view is hard to explain, as there is a great deal of copper scrap in the country, but the dealer was quite firm in his opinion regarding the higher price for the last three months of the year.

NEW YORK FLOODED WITH MORE QUERIES BUT NOT WITH BUSINESS

Special to CANADIAN MACHINERY

NEW YORK, May 8.—The situation in the machine-tool trade grows more and more confusing. The volume of inquiry keeps up at an amazing rate, but the volume of buying is very small in proportion. In fact, so little business has come in during the past month that a few machine-tool plants are curtailing hours of work, and cutting down the number of workmen. If it were not for the large quantity of Government tools soon to be placed on the market the trade would feel confident that machine-tool orders would be fairly plentiful when a more settled feeling becomes prevalent among buyers. These Government tools constitute a factor, however, with which the trade does not know how to reckon. More than 300 plants in the United States and Canada contain equipment which must be sold, and to what extent the disposal of this equipment will interfere with business of the machine-tool manufacturers is a question that can be determined only by experience. There is about an equal amount of optimism and pessimism on the subject.

Meanwhile, machine-tool builders continue to reduce prices even in the face of recent assertions that they would not do so. Radial and upright drills, milling machines and cutter and tool grinders have been reduced from 10 to 30 per cent. With few exceptions all machine tools have been reduced from 0 to 30 per cent. since the first of the year, but many of them are still 100 per cent. above prewar prices.

The difficulties confronting the Government in the sale of its tools are illustrated by the action taken by the Bureau of Aircraft Production, War Department, in rejecting all bids on 630 used tools from the plant of the Union Switch and Signal Co., Swissvale, Pa., which during the war was engaged in making Lorhone airplane motors. The Bureau of Aircraft Production found the bids were below the appraisal valuations of the tools. Evidently the prospective buyers were looking for "bargains," and bid on that basis.

Much to Come Out Yet

A considerable number of the used tools from war plants which have already been put upon the market have been absorbed, but the surface has barely been scratched as yet. About 1,200 or more tools from the Wright Martin Aircraft Corporation plant at Long Island City, N.Y., which was engaged in making Hispano-Suiza motors, will soon be offered for sale. The equipment of the Eddystone Munitions Co., Eddystone, Pa., consisting of [illegible] hardened tools used for shell work, is on the market.

The machine-tool trade has noted with interest the great automobile development which is going on in Canada. In addition to the $6,000,000 plant which the General Motors Corporation will build at Walkerville, Ont., it is announced that several million dollars more will be expended by Detroit, Toledo and Michigan companies for Canadian branch factories. The Maxwell-Chalmers Co. will spend at least $1,000,000 for new units at its present Canadian plants; the Champion Spark Plug Co., Toledo, Ohio, proposes a $500,000 factory at Windsor, Ont.; the Auto Specialty Co., St. Joseph, Mich., expects to put up a $250,000 factory; the Kelsey Wheel Co., Detroit, contemplates extensions which will double its present Canadian output; the Motor Products Corporation, Detroit, will shortly start work on a big plant to care for Canadian trade, and the Republic Motor Truck Co., Alma., Mich., will locate its new Canadian plant at London, Ont., and work is to be begun immediately.

A Slump in Tractors

The tractor industry in the United States, as was recently predicted in this column, might be the case, appears to have been overdone. Many of the plants were built and equipped on expectations of business which has not materialized. Farmers are not buying tractors as rapidly as it was expected they would and consequently the tractor business has taken a slump. Much prospective buying of machine tools has therefore been postponed, perhaps indefinitely. For example, the General Motors Corporation had intended to buy a large list of equipment for its tractor works at Janesville, Wis., but under present conditions no such action will be taken and the plant will be used merely for assembling. The Allis-Chalmers Mfg. Co. had plans for a tractor plant at Milwaukee, Wis., and these plans are now held in abeyance until business develops. Farmers are buying automobiles but they are not taking hold of the tractor proposition as it was hoped they would.

The only buying of importance in this market in the past week has been done by the Dubied Machinery Co., New York, a Swiss concern, which closed for about 100 tools for its Swiss and English plants. The Standard Oil Co. of New Jersey is expected to buy this week for a repair shop at Bayway, N.J., and has issued a list of tools for shipment to Rumania, this being an addition to a similar list issued several weeks ago, on which no purchases have yet been made. The E. W. Bliss Co., Brooklyn, has come into the market for about thirty large tools and the American International Shipbuilding Corporation, Philadelphia, wants 400 small lathes, shapers, drills and grinders and 100 motors for repair shops on merchant ships. The Federal Shipbuilding Co., Kearney, N.J., is expected to buy a large amount of equipment soon for a dry dock and ship repair plant adjoining its shipbuilding plant.

U. S. JUSTICE DEPARTMENT NEVER SANCTIONED FIXING OF PRICES

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., May 8.—The whole of the iron and steel market may be described as being in a waiting attitude, as the market is much duller than would be expected, on an average, even in ordinarily dull times, but the question is what the trade is waiting for. As noted in last report, the trade does not always assign real reason for its waiting attitude, and the reference in some quarters to buyers waiting for a settlement of the so-called "price-muddle" at Washington is not entitled to much confidence. It is probable the buyers have forgotten all about the matter, except that some may feel that if the Railroad Administration would begin an active buying campaign it would stimulate them to take hold also. Inasmuch as the Railroad Administration would not buy much steel, no matter how satisfactory the prices quoted might be, this feature may be dismissed.

That the steel people, on the other hand, are waiting for further action at Washington, or a declaration by the Industrial Board that it is done with its [illegible] greatly to be doubted. In the past few weeks there has been much talk of an "open market" in steel products, as being at hand or near at hand. It might be thought, therefore, that the steel producers have simply been waiting for the Industrial Board to publish its obituary, in order to throw the steel market open to competition. Observation of the past ten days indicates that the attitude is quite the contrary. The steel producers evince no disposition to have an open market either now or at any other time in the future, unless there is a great change in fundamental conditions.

Railroad Buying

After receipt of cablegrams from the President, the Industrial Board made a very graceful switch, and while at first it insisted to the Railroad Administration that the latter had to buy steel at the prices the Industrial Board set, the board has since issued a statement in which it blandly disclaims any desire to dictate prices, explaining that it is constituted merely to be an "inermediary,"

as, for instance, between the steel producers and the Railroad Administration. That is what everybody understood from the original announcement, and one of the criticisms of the board, in these reports and elsewhere, was that it departed from that platform when it insisted on the Railroad Administration buying at the prices named. The Industrial Board now goes still further, indeed, and while calling itself an intermediary, arranged a meeting between the steel committee and the Railroad Administration, at which the Industrial Board would not be present at all.

In these negotiations it seems reasonably certain the steel producers will refuse the Railroad Administration any further price concessions. It has very little to gain by offering concessions, and much to gain by refusing. Owing to the failure of the Department of Justice to approve the Industrial Board price fixing, which was really the most important respect in which the carrying out of the original program disappointed the steel producers, the producers are not well organized for price maintenance, except through their general and more or less tacit understanding. To make a decided stand against concessions to the Railroad Administration would tend to stiffen the backbone of all producers, whereas to make concessions might be suggestive that producers could make concessions to other consumers at later times.

As to railroad buying, the curious thing is that so few people realize that at best the Railroad Administration would buy very little. Rails have been mentioned as the chief item, but the statistics of rail production in 1918, recently made public, indicate that in that year the steam roads received about 1,400,000 gross tons of rails for replacement purposes, and all analysis shows that such a tonnage was a trifle above, rather than below a year's normal requirements. Then it is now well known that this year was entered with about 1,200,000 tons on rail mill books, due the railroads at the much advertised average price of $36 a ton, the Industrial Board prices being $45 for Bessemer and $47 for open-hearth. Deliveries have been going forward right along and will be completed about next July. The supply should approximately take care of the most necessary replacement work of this year. Of course if the railroads had plenty of money they might replace rails on a more liberal scale, but that is not their position. In the four months after the signing of the armistice the railroads earned $114,000,000 while the Government guarantee for the period is $259,000,000. The deficit must be made up out of the public funds, and how much money will the roads have when they are returned to their owners and the guarantee ceases? As to the cars, there is probably a surplus to-day of 350,000 cars or more, and there are also surplus locomotives. No doubt in the long run the roads will be in need of making great improvements, but now is not the time when the Railroad Administration would be disposed to embark on such a program. Congress failed to pass the $750,000,000 appropriation for the "revolving fund" out of which deficits, below the Government earning guarantee, are made, and at the first of each month the Railroad Administration has to issue to the roads, to meet their most pressing obligations, "certificates of indebtedness" which the railroads use as collateral for loans.

Thus the outcome of the present negotiations between the steel committee and the Railroad Administration is likely to be just as follows: (1) The steel producers will refuse to make further price concessions; (2) The Railroad Administration will point out that it has no orders to place anyhow.

Pig Iron

Pig iron presents a refreshing contrast to steel, marketwise, even though it is very dull. There is more than the ordinary pre-war "open market" in pig iron. The normal open market means that there is at any date a recognized price, with an advancing or declining tendency. One producer advances his price and, usually within a few days, others follow, or there is a cut in prices, with corresponding following. Now the market is even more open than that, as there is actual bargaining whenever there is any tonnage of importance to be placed. One interest, buying Alabama iron, has been bargaining, making bids that are refused while the sellers make offers which are refused. In the local market no inquiry large enough to warrant bargaining has appeared.

Mill Operations

Steel mill operations are now averaging not more than 60 per cent. of capacity and the rate continues to decline. In some branches of the finished steel trade a slight increase has been observed in current bookings, but old orders are becoming exhausted more rapidly than new buying appears.

SCRAP IRON

THE market is dull at most points, with some grades in demand. At one centre the British Government has sold a large quantity of tractor steel.

Following are reports from various points:

Philadelphia.—There is but little demand for scrap in this district. Wrought pipe is selling at $17.25 to $17.50 delivered, and machine shop turnings at $11.25, with blast furnace turnings at $9.75 to $10.25. The scrap in Government hands amounting to 453,000 tons will be sold by sealed tender.

New York.—The weaker tone prevailing throughout the market is making yardmen less anxious to hold their stocks. The demand which was in evidence last week has subsided. The only change in prices is in wrought long stock, now quoted at $16 to $17, f.o.b. New York.

Pittsburgh.—There is a firm tone to the market there, even in the face of the lack of activity. The rumor that the Carnegie Company is in the market to buy heavy melting steel, and is willing to pay $16, has some effect on the market. The Pennsylvania Railroad is offering a heavy quantity of scrap, amounting to 4,000 tons.

Cleveland.—There is no indication of consumers showing any interest in the efforts or dealers to interest them. Heavy melting steel has gone back to $14.75. Turnings are quoted at $8 to $8.75.

Detroit.—The principal event in the past week has been the sale of 30,000 tons of tractor steel by the British Government to Joseph Joseph & Co., of New York. The price is understood to be under $20 a ton. The material was made in the U.S. and shipped to various automobile plants.

Chicago.—Most grades have dropped from 50 cents to $1, in the absence of buying. Dealers evidently expect prices to go still lower, as they are not laying stock to lay down. Railways are offering about 6,000 tons, including 600 tons short rails.

St. Louis.—There is no change in the market during the past week. While business is moving actively between dealers. Prices generally are headed for lower levels. Any offering of a considerable quantity would indicate large declines.

Cincinnati.—The only business transacted lately has been some purchases of cast iron borings by a Pennsylvania buyer. Cast borings are quoted at a minimum of $8 per ton, to dealers' yards.

TENDERS

The Inspector of Penitentiaries, Ottawa, is calling for tenders for the purchase of a binder twine plant. Tenders must be sealed and endorsed "Tender for Binder Twine Plant," and will be received up till June 2nd. Machinery is at Kingston Penitentiary, where it may be viewed. Terms of sale, cash.

The Town of Ford City are calling for tenders for the construction of concrete pavements on Drouillard Road from Charles Street to the Essex Terminal Railway in the Town of Ford City. Plans and specifications may be seen at the office of Mr. Owen McKay, C.E., Walkerville. Tenders must be accompanied by a marked cheque, payable to the town treasurer for 2½ per cent. of the amount of the tender, and tenders addressed to J. F. Foster, town clerk.

The City of St. John, N.B., is calling for tenders for driving piles at the approaches to the Ferry Floats, east side, according to plans to be seen in the office of the City Engineer. Cash or certified check to the amount of 5 per cent. of the amount of the tender must accompany each tender, and tenders must be sent to H. E. Wardroper, Esq., Common Clerk on Forms, to be furnished by the city, and endorsed "Tender for driving piles at ferry approaches, St. John, East Side."

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$18 50	$18 50
Electro copper	17 50	17 50
Castings, copper	17 00	17 00
Tin	54 00	55 00
Spelter	8 00	8 25
Lead	6 50	7 50
Antimony	8 00	8 50
Aluminum	28 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 32	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	7 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	9 50	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	17 00	14 00
Pipe wrought	8 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	5 00	5 00
Stove plate	12 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, ⅜ 5-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ⅜ and less	25
Blank bolts	25
Bolt ends	
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd. brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent.
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ½ lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
Blanket drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks..list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized		
Queen's Head,28 B.W.G.		
Fleur-de-Lis, 28 B.W.G.		
Gorbal's Best, No. 28		
Colborne Crown, No. 28		
Premier, No. 28 U.S.		7 95
Premier, 10¾ oz.		8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B. ⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size	Screwed	Lapwelded
1 in.	$25 00	$
1¼ in.	27 00	
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.		45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Idea!	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

Tenders will be received for the construction of [illegible] the "Bowmanville Brook Bridge" until noon, May 28th, for the construction of concrete abutments, concrete pedestals, floor construction, grading, and other work necessary in the building of a bridge on the Provincial highway over Bowmanville Brook in the Town of Bowmanville. Plans and specifications can be seen at the office of the Town Clerk, Bowmanville, and at the office of the Deputy Minister of Highways, Parliament Buildings, Toronto.

Sarnia. — A popular appointment is announced by the Northern Navigation Co., that of Captain A. W Wright to the command of the "Noronic." The captain, who has been in the employ of the company for thirty years, is one of the most capable mariners on the lakes. He has grown up with boats since he was a boy, and has filled every position from boy to master. In the great storm of November, 1913, when seventeen vessels and an enormous number of lives were lost, Captain Wright brought his then command, the "Sarnia," through in safety, which was recognized as a notable achievement. Captain Wright was born in Collingwood in 1871, and has lived in Sarnia since 1907.

BOOK REVIEW

The Whitman & Barnes Manufacturing Company, Akron, Ohio, have issued Number 91, descriptive of twist drills, reamers, special drop forgings, and other [illegible] products.

The Fellows Gear Shaper Company, Springfield, Vt., have issued a new publication on commercial gear cutting. This publication is of value from the standpoint of production, and clearly describes the Fellows gear shaper.

The Smart-Turner Machine Company, Hamilton, Canada, have issued Catalogue No. 11, [illegible] factory [illegible]. The publication deals with the manufacture of [illegible] and [illegible] which they are sold.

The Oliver Machinery Company, Grand Rapids, Michigan, have issued a bulletin descriptive of their new universal motor drive for shapers. This bulletin is descriptive of a great improvement in shaper designs brought out by this firm.

The Link-Belt Company, Chicago, Ill., have issued [illegible] number 220, descriptive of the Peck Over-lapping Pivoted Pocket Carrier for the economical and efficient carrying of coal, coke, ashes, cement, sand, ore, stone, and other materials.

The Hart Roller Bearing Company, Orange, New Jersey, have issued a small pamphlet on the use of their ball bearing universal casters for the plate shop. This caster is a great improvement over the ordinary caster found in the plate shops of shipyards.

The Frank G. Pierson Company, Chicago, Ill., [illegible] on the [illegible]

MONTREAL NOTES OF THE WEEK

Last week the newly-organized Canadian Government Merchant Marine Ltd. commenced active operations in connection with their ocean service. They have taken over Shed No. 24 on the harbor front and have opened offices there. This company will employ only those boats that have been constructed for the Canadian Government. The "Canadian Voyager" and the "Canadian Pioneer" will be the first vessels in the service. It is anticipated that before the middle of the summer about twenty boats will be operating under this new service. It is the intention of the company to develop new trade centres, and some of the first trips made will be to West India and South America ports. Tropical and semi-tropical food products will form the major part of the cargoes which these ships will bring back to Montreal.

The steel vessel "Labrador," built for the Gulf of St. Lawrence Shipping and Trading Company, was launched last week from the yards of the Davie Shipbuilding Company. Mr. Bernier, the Arctic explorer, is one of the directors of the [illegible] company.

H. E. Whittenberger, formerly general superintendent of the Grand Trunk Railway at Montreal, has been made the Federal manager of the Grand Trunk Western lines, under the United States administration. Mr. Whittenberger, who has been in the services of the G. T. R. for the past twenty-five years, was transferred [illegible] to be general superintendent of the Ontario division.

The Metagama, the first trans-Atlantic passenger vessel to reach Montreal, came [illegible] Friday morning. A large number of [illegible] soldiers and their dependents, but many other [illegible] on the [illegible]. Although this vessel has not been to port for a couple of years there was little trouble in bringing [illegible]. This was largely due to the efficient arrangement of the lights and buoys along the route. The [illegible] William Grafton

Lieut.-Col. W. J. Sadler, of Sadler and Haworth, belting manufacturers, will be the new chairman of the Montreal division of the Canadian Manufacturers' Association.

The Canadian National Railways are placing into service a new type of steel sleeper that has been especially developed for the use of returning soldiers; these will provide the maximum of comfort and will be a distinct improvement over the old type of tourist sleeping car. Several of these are already in commission, and in all, 50 will be delivered. The Canadian Car and Foundry Co. of Montreal are building 100 of these cars and the Pullman Co. are constructing the remaining fifty. The all-steel construction provides the maximum of safety, and special attention has been paid to the end of the cars to prevent telescoping in the event of an accident. The full complement is expected to be in operation before the middle of the summer. The cars will eventually become the standard tourist car for immigration service.

Improvements to the Port of Montreal, which have been necessarily postponed owing to the war, will shortly be proceeded with. These were part of a programme that was mapped out early in 1914, but were laid aside for more pressing war requirements. The extensions, alterations and additions which are to be made will comprise three main features —namely, better railway facilities, including the electrification of the harbor railway tracks, more ample wharf accommodation, new transit sheds and cold storage accommodation. About $150,000 will be spent on the construction of new sidings. The cost of the new three-storey cold-storage plant and public warehouse, to be built in connection with the harbor will be approximately one and a half million dollars. Additional pier accommodation will be made so that the largest vessels plying the St. Lawrence will be able to dock with the greatest ease.

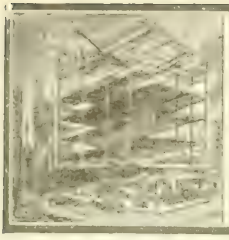
Devices. The use of air for the operation [illegible] has rendered possible very material increase in the production of repetition work. The use of this particular device is fully explained in this [illegible].

The American Steam Conveyor Corporation, New York, have issued Modern Methods of Ash Disposal. This publication is an unusually complete and carefully compiled treatise on the disposal of ashes in the power plant. It takes up the various methods which are in common use, and specializes on steam jet conveyance.

The Simonds Manufacturing Company, Pittsburgh, Mass., have issued a publication on Simonds' products in the war. This is a very attractive and interesting publication dealing with the part the Simonds Company played in the winning of the war. The development of the American Steel Helmet was in large measure due to the activities of this firm and the manufacturing of armor plate for machine guns and other purposes. The steel used by this firm was found to be of extremely high quality.

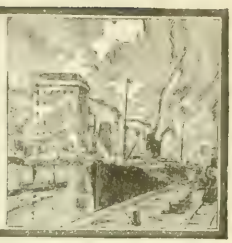
Engberg's Electric and Mechanical Works, St. Joseph, Mich., have issued a catalogue descriptive of the Engberg direct current generating set, which is made in capacities of from one to fifty kw. This publication is an excellent example of commercial printing and furnishes an unusually complete description of the generating set manufactured by this firm.

The American Metal Market and Daily Iron and Steel Report, New York, have issued the 1919 edition of Metal Statistics. This publication is an unusually complete and carefully compiled statistical review of not only the iron and steel markets, but also of the non-ferrous trade. It will be of considerable interest to those interested in market conditions.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES



TRADE GOSSIP

I. M. B. Plant Bought.—It is stated that the Trenton plant of the Imperial Munitions Board, which was being sold in small parcels, has been purchased outright by Messrs. Briggs & Turviss, representing Chicago interests. The deal is said to cover the whole of the 255 acres.

More Lumber Credits. — Further credits for the purchase of lumber in Canada for Great Britain will be urged by Sir Joseph Ball, head of the British lumber purchasing commission. A credit of $40,000,000 has already been extended and taken up, but there are, it is stated, still very heavy demands for Canadian lumber in Europe.

Electrify Montreal Harbor Rys.—The Harbor Commissioners are contemplating the complete electrification of the railway system of the harbor, and the erection of a $1,000,000 cold storage plant. Plans for lengthening of piers and construction of transit sheds are also included. Work on the harbor railway and cold storage plant will be started immediately.

To Settle Dispute.—The Nova Scotia Legislature is about to introduce a bill to force the Dominion Coal Co. and the Nova Scotia Steel and Coal Co. to settle their differences. This will be done by compelling the companies to submit to a re-arrangement of their leases, which will allocate all the areas north of Sydney Harbor to the Scotia, and all those south of Sydney Harbor to the Dominion Co.

The Booth-Hall Company, designers and builders of electric furnaces, announce the removal of their executive and sales offices to rooms 1007-8 Hearst Building, 326 West Madison Street, Chicago. This change was necessitated by new arrangements in connection with the manufacturing of their electric furnace equipment. Increased facilities for turning out standardized furnace equipment has been provided with a large manufacturing company located in Chicago.

Trade With India.—The outlook for exports to India, according to a prominent trade authority lately returned from Bombay, is particularly good just now. There is a good market for all kinds of dry goods, as well as milling machinery and mill supplies. There has been dissatisfaction with goods imported by Indian firms in the past, and there is a good chance for well-made merchandise from this country to get a footing. Negotiations should be made with the native firms direct, it is advised, by sending representatives to India.

Grant for Smelter.—A delegation waited on Premier Oliver of British Columbia with a request for a loan of $300,000 for the purpose of establishing a Rotherd electric smelting plant in the province. The deputation was headed by Mayor Vance, of North Vancouver, and Reeve Fletcher, of Point Grey. Samples of steel were shown to the Ministers, and they were informed that the high grade exhibits had been made from the ore in the space of four hours. The delegation were promised that a full investigation would be made into the project by the Minister of Mines.

Cannot Use Name.—The Canadian Government has refused permission to register the name of the "Returned Soldiers' Co-operative Lumber Co" The Government takes the ground that as this is a private company, not assisted by the Government in any way, it cannot allow the use of the name. The men interested in the project say that the name would be one of their big assets, but they will allow the question to be in abeyance until all the men have returned, when they will try and induce the Government to look more favorably on the matter.

St. Thomas Backs New Industry.—The Board of Trade of this city gathered to hear the proposition of the Provincial Machine Co. to establish a plant for the manufacture of talking machine parts, and talking machines. Mr. Anderson, representing the company, showed that there was a great demand for these parts, which could not be supplied even from the States at present. By manufacturing in Canada they would have a 40 per cent. advantage over firms in the States. A resolution was passed endorsing the project, and embodying the opinion of the board that it would be a safe investment for their citizens.

The Water Tariff Bill.—The bill introduced by Joseph E. Armstrong, M.P. for East Lambton, for the control of rates on water-borne freight by the Canadian Railway Commission, will be strenuously opposed by shipping men. They contend that this bill has been a consuming passion with Mr. Armstrong for years, and if it is passed will operate to put the small owner, who sails his own vessel, completely out of business. The small owner serves a certain class of shippers, who are willing to take a certain amount of risk for a low freight rate, and the small owner has a legitimate place in the country's business.

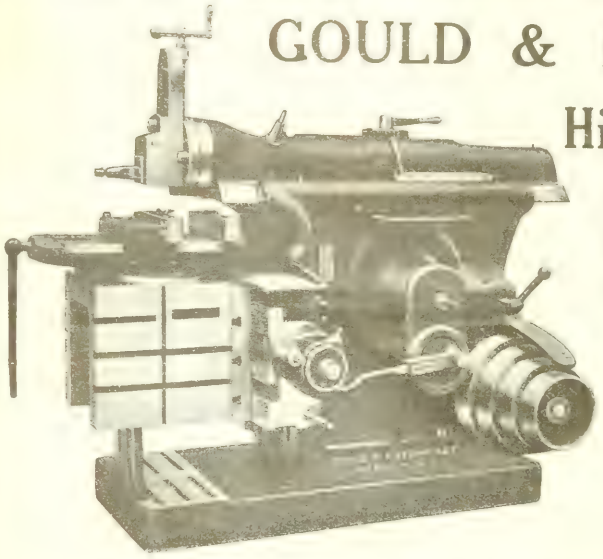
Build at Walkerville. — General Motors, Ltd., who contemplate spending several million dollars in a Walkerville plant, under date of April 28, write CANADIAN MACHINERY to say: "The initial Walkerville plans call for 200 x 600 single storey saw tooth manufacturing plant. This will be used for manufacturing motors and axles. Other plants to follow this one will possibly include passenger car and truck units. The Canadian plant will not only be Canadian in name, but in fact, and it is the desire of "General Motors" to co-operate to the fullest extent with Canadian labor and Canadian material."

Orillia Adopts Nine-Hour Day.—The manufacturers of Orillia have now adopted the nine-hour day as a standard, and the change will not be accompanied by any reduction in wages. The hours adopted are 7 a.m. to 12 a.m. and 1 p.m. to 5 p.m. The change is the outcome of a suggestion made by the Council of the Board of Trade, that in order to forestall any unrest such as has been evidenced in other communities, the manufacturers should make as generous conditions as possible for their employees, and the employers took the suggestion in good spirit and acted on it. Their action was all the more to be commended, as business is none too brisk just now in the various industries.

Business Growing.—It is expected that before the end of May an adjustment of the shell contracts which the McAvity Co., of St. John, N.B., were engaged in at their Marsh Road plant will be reached, so that the firm will be free to develop the plans which they have in view for these immense works. In the meantime the new steel foundry in the rear of the munition factory is being completed and made ready for work. The firm is also carrying on the general foundry manufacturing business in their Broad Street and Water Street plants, turning out brass material of various kinds, and material for ships, railway and mining purposes. It is intended that before long all the city plants of this enterprising firm will be assembled in their Marsh Road buildings.

To Buy Canadian Goods. — Conditions in China were explained to a number of business men, members of the Canadian Manufacturers' Association by J. W. Ross, Canadian Trade Commissioner to

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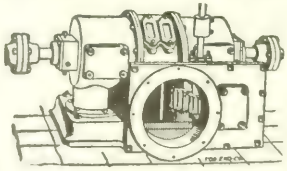
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Banks Indicate Business Growth

"NEW YORK agencies of Canadian banks have, within the last few weeks, received quite a number of inquiries from American manufacturers looking toward the establishment of branches in Canada in the event of the Canadian tariff wall standing and Imperial preference becoming a fact.

"And not only would factories be established, but a great volume of trade, which, under present conditions, flows from the United States to different parts of the British Empire, would be diverted so as to pass through Canada."

Above is a sentence from the regular weekly letter of THE FINANCIAL POST'S resident New York correspondent. For further important information along this line see

The Financial Post

of May 3rd with special section featuring Banking and showing how efficiently business and national needs have been served during the war, while at the same time the interests of depositors and shareholders have been fully safeguarded. Contents of this special issue include:

Europe's Needs Are Cutting Into Wheat Supply.
British Paper Trade Anxious to Deal With Us.
Bolshevism Encouraged by Ottawa's Laxity.
Market Demand for Structural Steel Reviving.
Merger Rumor Accompanies Rise of Maple Leaf.
Heavy Losses for Shareholders of "Safe-on-Sea."
Bright Outlook Predicted for the Dome Mines.
Meeting Criticism of Branch Bank System.
Profits Necessary to Health of Industry (Editorial).
Sky-scraper as Security for $450,000 Bonds.
Winnipeg Water District's Cost Near $15,000,000.
Aviation Risks Being Insured by English Companies.
Effect of Wage Rate on Building.

SPECIAL SECTION.

How Canada's Banking System Served the Nation During the War.
The Banks Have Guarded Great Public Deposits.
General Prosperity Reflected in Bank Profits.
Canadian and American Banking Interests More Closely Drawn Together.
England Making Effort to Return to Gold Standard.
Relations of the Banks and Stock Exchange.
Sir Thos. White Defends Policy of Government Re Bank Mortgages.

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C.M.

Canada, at the office of the association. He pointed out that the Greeks were a great nation of traders, and had developed their grain growing and stock raising very extensively. There was a big market for foreign goods, and he mentioned the fact that several thousand commercial travelers from the United States were based for Greece this year. Shanghai is the principal port and 40 per cent. of the entire trade passes through there. A number of Canadian firms have been conferring with Mr. Ross on the advisability of placing their goods on the Chinese market.

Canadian Exhibits.—Canadian manufacturers were very well represented at the International Exhibition which was held in Lyons, France, March 1 to 15. Mr. W. E. Clarke, representing the Pedlar People, Oshawa, who has just returned, states that Canadian exhibits ranging from textiles to concrete machinery were displayed to particular advantage, having been confined to one locality and not distributed promiscuously, as was the case with some displays. Canadian military bands assisted in making the exhibit from this country a centre of attraction, and the general opinion of manufacturers represented was that their presence was well worth while, from the viewpoint of prospective business. Enquiries were encouraging, and when affairs work back to their normal trend results may be looked for. Following the fair, Canadian representatives enjoyed the privilege of a trip through a part of the devastated area. The general feeling in France seems to be one of optimism in a degree remarkable for a people who have suffered so severely and now must work out the problems of reconstruction before they can enjoy to the full the benefits of international business.

May Open Up Trade.—A large industrial exhibition in which Canadian manufacturers are being invited to cooperate is being arranged in Athens, the Greek Capital, in September and October, by the "Federation of British Industries," a metropolitan combine designed to regain trade lost during the war. A communication to the International Trade Industries points out the timeliness of the exhibition and the favorable opportunities it will offer to bring before Greek, Balkan and Levant merchants Canadian products and manufactures. It is believed that participation at the commencement of trade relations between the two countries will lead to permanent trade. The friendliness of the Greek Government is assured, and the communication hints that there would be good justification for making the Canadian exhibit one of the most prominent. The Greeks are the chief merchants and traders throughout the eastern Mediterranean coast, Asia Minor and Balkans, and it is figured that there is in Greece at present an accumulation of cash to the extent of $300,000,000 above normal, secured in war orders, and that merchants are impatient to receive machinery and raw materials to carry on national industries and international trade.

MARINE

Buffalo, N.Y.—The grounding of the steamer Sonoma, loaded with grain and having a draught of 19 feet 6 inches, was caused by the moving of the buoys marking the channel.

Port Colborne.—The "Canadian Warrior," built for the Imperial Munition Board, made her initial trip through the Welland Canal on her way to Montreal, where she will load for Europe.

Collingwood.—The Collingwood Shipbuilding Co. successfully launched the steamer "Canadian Recruit." She was built to the order of the Canadian Government for their new fleet of carriers.

Midland.—The big fleet of American freighters that have been wintering in Midland have all sailed. They numbered sixty, and the place looks deserted, now that they have gone. The fleet was the largest in number that has ever wintered in the Georgian Bay.

Quebec.—The second launch to take place in two days was staged at the yards of the Davey Shipbuilding Company at Lauzon recently. This was one of the trawlers built there for the Department of Naval Service.

Vancouver.—The War Column was launched from the yards of the Coughlan Ship Yards, being the ninth of the 8,800-ton steel vessels built by these builders. The keel of an 8,100-ton Dominion Government steamer was laid on the vacated ways a few hours after.

Victoria. — The contract for the breechings and smokestacks for ten of the wooden steamships building by the Foundation Co. for the French Government have been awarded to the National Steel Construction Co., of Duwanish Waterway, Seattle. The work is under way.

Quebec. — News has been received from Cap St. Michel that the "War Toronto," built by the Toronto Shipbuilding Co. last fall, had gone aground while on her voyage to Quebec. The "War Toronto" was on her way to Quebec to load lumber for England. She was one of the wooden steamers built for the Imperial Munitions Board.

London.—While en route from Windsor to Ottawa the Hon. F. B. Carvell stopped off here to hear the claims of London, St Thomas, Middlesex, and Elgin for harbor improvements. He went down to Port Stanley on a special train of the L. & P. S. R., accompanied by a delegation led by Sir Adam Beck, chairman of the London Railway Commission.

Victoria.—The contract for rigging the twenty wooden steamers being built by the Foundation Company has been awarded to Haviside, Withers & Davis. ship riggers, of San Francisco, and Frank W. Haviside will be in charge of the work. The labor employed will all be local, through the Foundation Company's organization.

45,000 SHOWERS

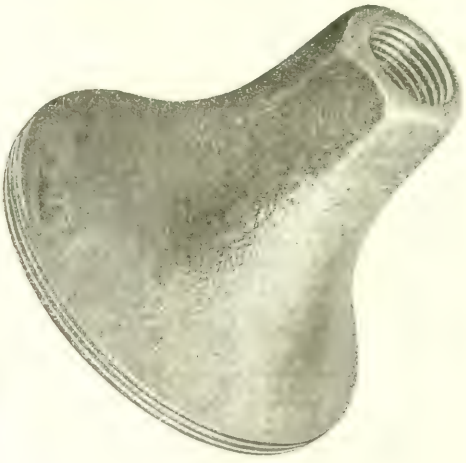
A Manufacturer Gives the Details of Filling a U. S. Government Order for 45,000 Shower Heads, Using Geometric Die Head and Collapsing Taps.

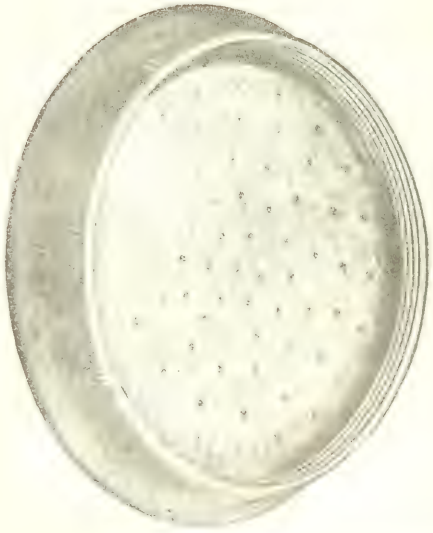
"On the main thread of the shank 3⅜"-16, we average 230 per hour, with a surface speed of about 400 feet per minute. On the pig iron end we averaged 220 per hour, with a surface speed of about 200 feet per minute. This speed may seem a little low, but we cut this down in order to get a quicker handling of the work. We handled these in air chuck, and in releasing air chuck the work automatically dropped to a box below.

"On the face, tapped 3⅜"-16, we averaged 210 per hour, with a surface speed of about 400 feet per minute.

"We were very much pleased with the Geometric tools on this work, especially with the chasers, as we completed 30,000 showers, male thread, with one set of these chasers."

Try a Geometric Thread-Cutting Die Head or Collapsing Tap on your work, and be equally pleased.





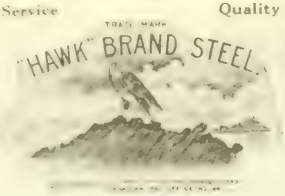
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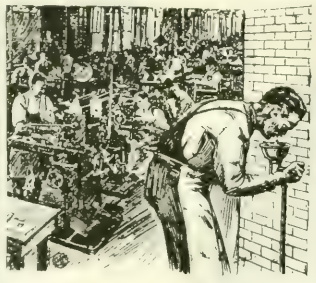


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Welland. — The "Cherokee" of the Canada Steamship Lines, Montreal, coming down loaded with coal, collided with the M.C.R. bridge, and had about 12 feet of her bows stove in. A long train was on the bridge, preventing it from being swung, and the current was too strong to stop the "Cherokee" quickly enough. The "Cherokee" will be towed to Port Colborne stern first, and navigation re-opened immediately.

Victoria. — The Foundation Company have launched the fourth of their wooden steamers for the French Government, the "Winnipeg" being the latest to take the water. She is a 3,000 ton, full powered, wooden steamship, and is the fourth vessel to be launched in the past two months. The "Strasbourg," "Metz" and "Mulhouse" are the names of the other three. The Foundation Company's band lent gaiety to the occasion.

Victoria, B.C.—The first ship to be launched from the Cholberg Yards was the schooner "Gunn," built to the order of Porsgrund, Damp & Seil Co., of Porsgrund, Norway, a vessel of 1,500 tons. She has been already chartered through the Universal Shipping & Trading Co. to load 1,200,000 feet of lumber for Europe, and will be ready for loading very shortly. The masts will be stepped under the shear legs of the Victoria Machinery Depot.

Montreal.—The Canadian Government Merchant Marine will be inaugurated here very shortly. The Government has taken over shed 24 on the harbor front, and H. Milbourne, marine superintendent of the Government line, has opened an office there. The "Canadian Ranger" and the "Canadian Pioneer" will be the first vessels on the service. They are 8,100 ton vessels. It is hoped by the middle of the season to have 20 vessels in service. The first cargoes will be Canadian produce for West Indian ports. The return cargo of the first vessel will be sugar from Havana.

Midland. — The "War Magic," the second boat to be constructed by the Midland Shipbuilding Co., was successfully launched, under conditions closely resembling those of the 24th October last, when the "War Fiend" was dropped into the bay. A cold wind was blowing and rain falling on both occasions. The "War Magic" is of the usual canal sized freighter type, and was built for the Imperial Munitions Board. She is for transatlantic service, her sister ship, the "War Fiend," has already made one trip to Sicily with a cargo of grain. The "War Magic's" machinery was built by the John Inglis Co., of Toronto.

CONTRACTS

Toronto.—The Board of Control gave the contract for the steel work for rebuilding the damaged section of the Exhibition grand stand to McGregor and McIntyre, of Toronto.

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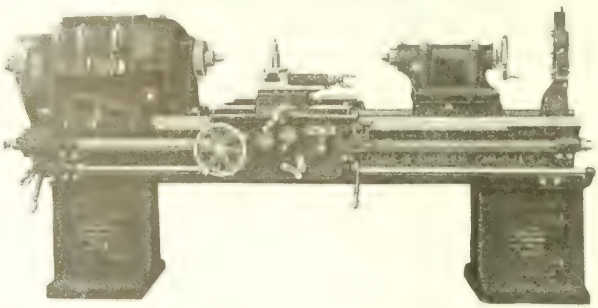
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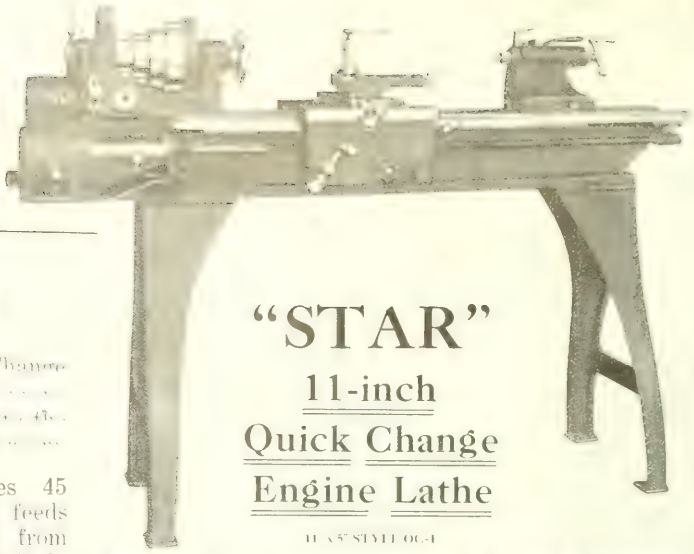
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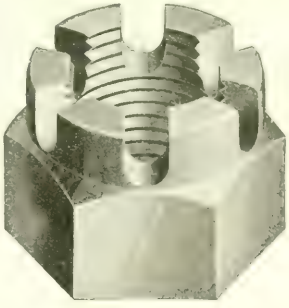
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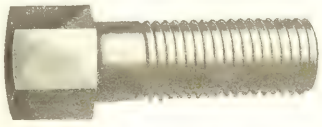
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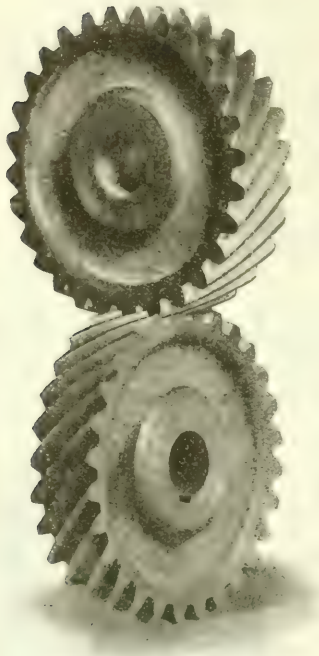
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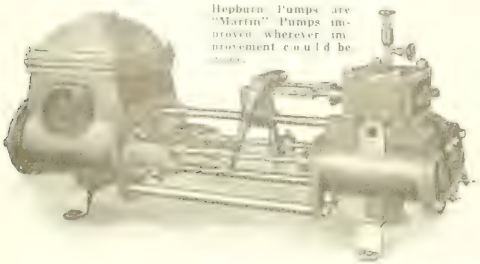
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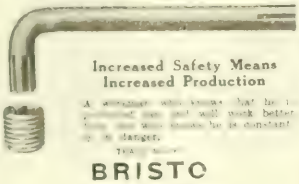
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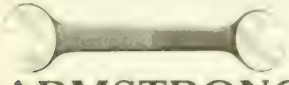
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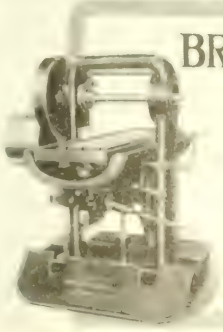
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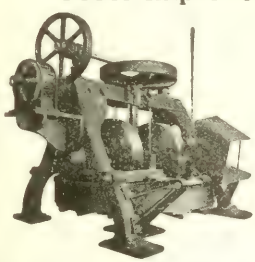
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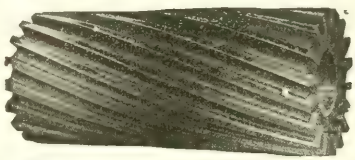


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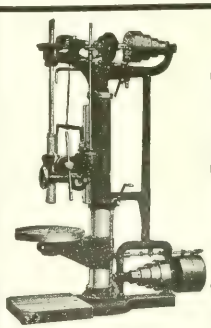
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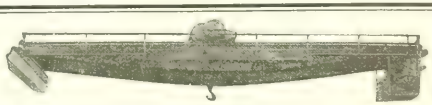
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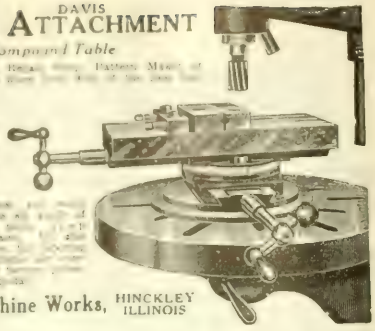
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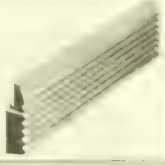
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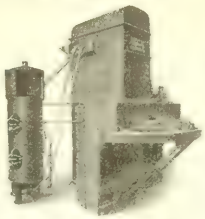
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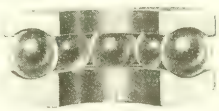
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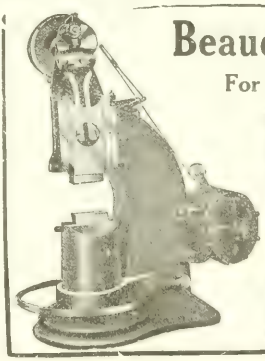
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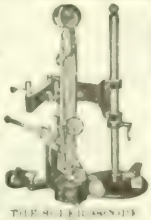
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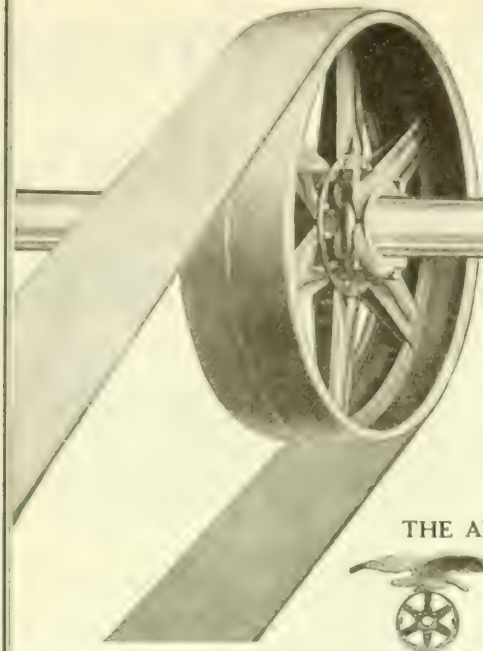
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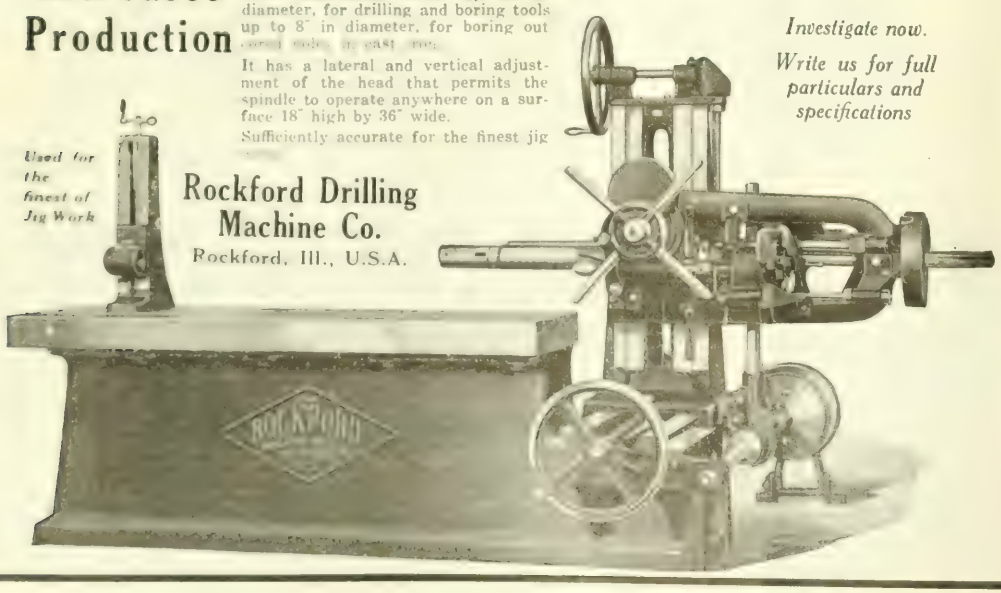
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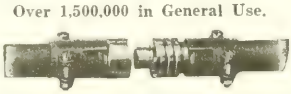
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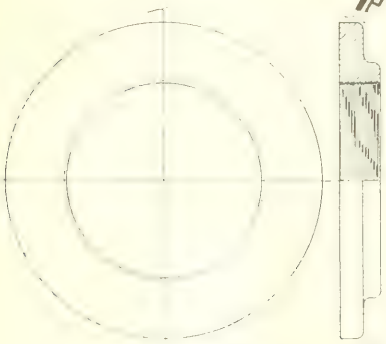
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Thread—8⅜" diameter, 1¾" long, 8-pitch Briggs tapered.

Time Study—

	Min.	Sec.
Chucking from floor	..	15
Facing ⅛" feed	1	40
Adjusting hob	..	10
Milling	2	30
Removing from chuck	..	10
Time complete operation, floor to floor...	4	45

Milling Feed—10½" per minute. Limits, .003. Entire flange finished in one chucking. Face and threads in perfect alignment.

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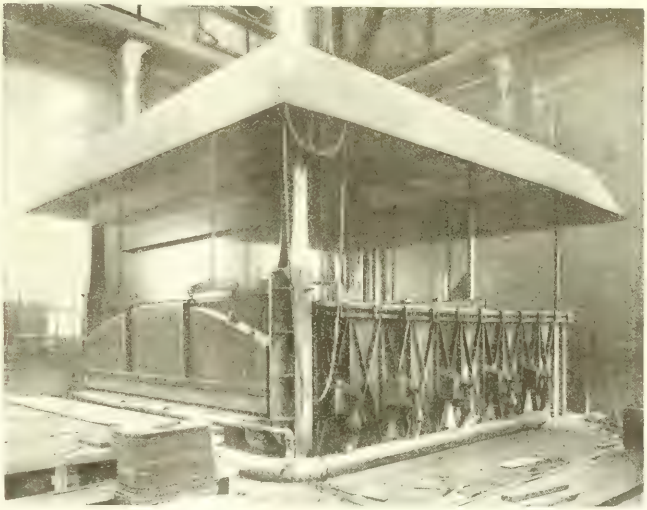
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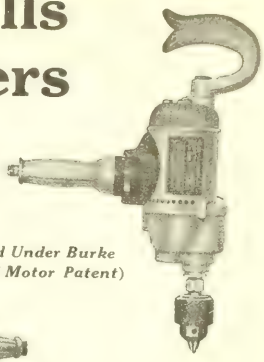
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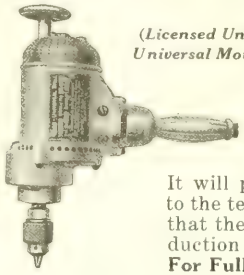
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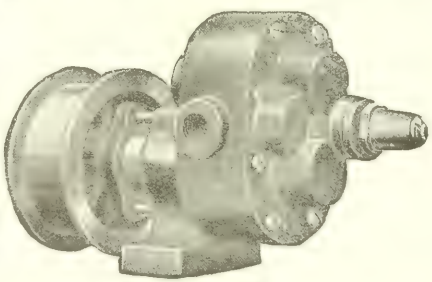
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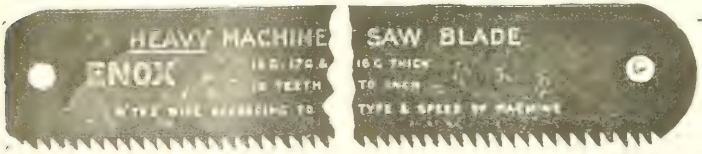
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UNEQUALED IN QUALITY ANY SIZE OR LENGTH

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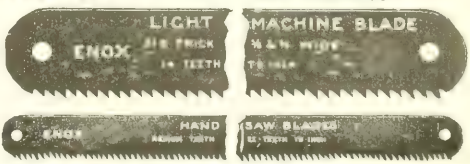


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[illegible]

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[illegible] & Co., [illegible], Ont.
[illegible]
[illegible]
[illegible]

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[illegible], N.Y.
[illegible], Toronto.
[illegible]

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[illegible], Ont.
[illegible], Mich.
[illegible], N.Y.
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[illegible], Philadelphia.
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[illegible], Que.
[illegible] Providence, R.I.
[illegible], Montreal.
[illegible], Ont.
[illegible] Owen Sound, Ont.
[illegible] & [illegible] Works, Ltd., Toronto.
[illegible], Ont.
[illegible], Ltd., Montreal, Que.
[illegible], Toronto.
[illegible], Que.

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[illegible], Pa.

PULLEYS, FRICTION CLUTCH
[illegible], Philadelphia.
[illegible], Conn.
[illegible], Que.
[illegible], Toronto, Ont.
[illegible], Manchester, Conn.
[illegible] & [illegible] Works, Ltd., Toronto.
[illegible], Montreal.
[illegible], Manchester, Conn.
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[illegible], Pa.

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[illegible], Ont.
[illegible], Montreal, Que.
[illegible]
[illegible], Syracuse, N.Y.
[illegible], Dundas, Ont.
[illegible], Galt, Ont.
[illegible], Montreal, Que.

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[illegible]
[illegible], Rockford, Ill.

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[illegible], Syracuse, N.Y.

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[illegible], Toronto.

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[illegible]
[illegible], Syracuse, N.Y.
[illegible], Toronto.
[illegible], Toronto.
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[illegible]
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[illegible], Montreal, Que.

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PUMPS, POWER FOR OIL AND GASOLINE
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[illegible], Que.

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[illegible], Toronto.
[illegible], N.Y.
[illegible], Montreal, Que.
[illegible], Canada.
[illegible], Ont.
[illegible], Montreal.
[illegible]
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[illegible], N.Y.
[illegible], Ont.
[illegible]
[illegible]
[illegible], Buffalo, N.Y.
[illegible] Machine & Tool Co., Toledo, O.
Williams & Wilson, Limited, Montreal, Que.

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PUNCHES, POWER
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[illegible], Hamilton, Ont.
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[illegible], Hastings, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
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Niles-Bement-Pond Co., New York.
[illegible], Buffalo, N.Y.
[illegible], Mich.
Williams & Wilson, Limited, Montreal, Que.

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Canada Machinery Corp., Galt, Ont.
[illegible], Mich.
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Brown, Boggs Co., Ltd., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Wickes & Co., Saginaw, Mich.

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Niles-Bement-Pond Co., New York.
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RASPS
[illegible]

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Standard Machy. & Supplies, Ltd., Montreal, Que.
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The Kelly Reamer Co., Cleveland, O.
Taylor, J. A. M., [illegible] Bldg., Toronto, Ont.
Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
[illegible] Twist Drill Co., Walkerville, Ont.

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Cleveland Twist Drill Co., Cleveland.
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Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Illinois Tool Works, Chicago, Ill.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Greenfield Tap & Die Corp., Greenfield, Mass.
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Wells Bros. of Can., Galt, Ont.

REAMERS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMERS, EXPANDING
Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIN
Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

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Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

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Greenfield Tap & Die Corp., Greenfield, Mass.
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Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
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Williams & Wilson, Limited, Montreal, Que.

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RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont.

RUBBER MILL MACHINERY
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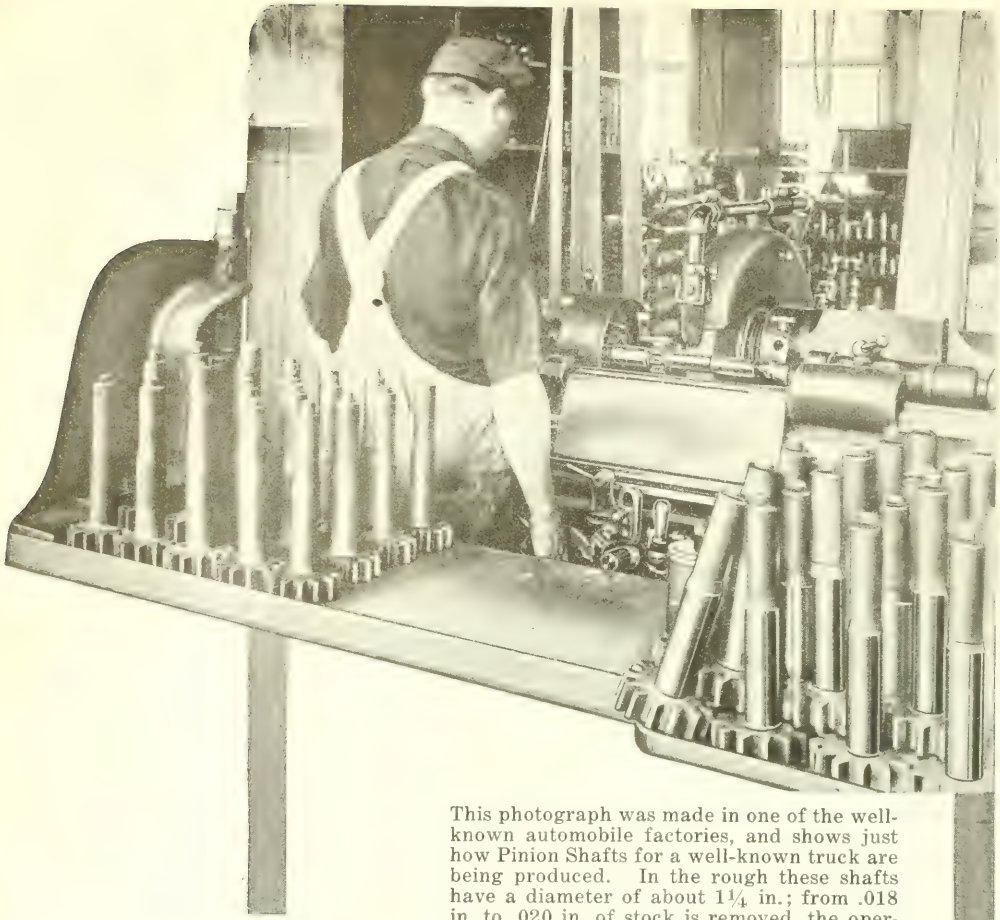
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James Chesterman & Co., Ltd., Sheffield, Eng.
Rice, Lewis & Son, Toronto, Ont.
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Lufkin Rule Co. of Can., Windsor, Ont.

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Here's Pinion Shaft Grinding On a Norton

This photograph was made in one of the well-known automobile factories, and shows just how Pinion Shafts for a well-known truck are being produced. In the rough these shafts have a diameter of about 1¼ in.; from .018 in. to .020 in. of stock is removed, the operator being allowed a tolerance of .0015 in. and the output is approximately 200 daily. The machine shown here has been in constant use over 8 years, has required hardly any repairs, and has always given splendid satisfaction.

This is fairly good grinding, but no better than you should obtain. Compare your results and if you are in need of additional information, write to us. We'll be glad to help you.

Norton Grinding Company

Chicago Store: 11 North Jefferson Street WORCESTER, MASS.

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SAWS, HACK (SEE HACK SAWS)
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SLINGS, CHAIN

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SQUARES

WILSON FEARED THE BRITISH

THE American President crossed the Atlantic in the first place with the idea in his mind that his ideals would be thoroughly in accord with those of the French statesmen; but he was rather afraid of a conflict with the British delegates. He found in reality that his plan for peace terms was as far removed from the French plan as the two poles. Then he crossed to London and was surprised to find that the ideas of the two Anglo-Saxon powers were identical.

This situation, according to J. W. Dafoe in the May issue of MACLEAN'S MAGAZINE, explains much that has developed at Versailles. Further, it contains the promise of a close *rapprochement* between the two great English-speaking democracies for all time to come.

Mr. Dafoe has contributed a remarkably interesting article to this number of MACLEAN'S, lifting the curtain on many of the puzzling situations that have arisen overseas. As the editor of the Manitoba *Free Press*, he is the dean of Canadian newspapermen; as the representative of the department of Public Information on the Canadian Mission to the Peace Conference, he was in a special position to learn what was transpiring. He tells of the really big part that Canada has played in the Proceedings and points out that Canada's status as a nation was firmly established in the eyes of the world when she was allowed separate representation.

A Dozen Other Features---Nationally Important

This May issue is full of articles of unusual significance for Canadian readers.

"SOLVING THE PROBLEM OF THE ARCTIC"
—By Vilhjalmur Stefansson

The second instalment of his remarkable story of the four years of exploration that he undertook for the Canadian Government in the region of the "Pole of Inaccessibility"—a harder place to reach than the North Pole.

"ORGANIZING FOR PEACE"
—By George Pearson

An article of the Great War Veterans' Association by a well-known author-soldier.

"THE CANADIANS IN SIBERIA"
—By Capt. W. E. Dunham

A graphic story of what our forces did in combatting the Bolsheviki, by an officer who has just returned.

"SAFE IN THE SADDLE"
—By J. K. Munro

A review of affairs at Ottawa in which the opinion is expressed that Union Government for the time being is safely entrenched.

The National Idea

The articles in this issue of MACLEAN'S reflect the national idea. Canada's part in the Peace Conference, the political situation at Ottawa, the exclusive report of Stefansson's national explorations, the national organization of our returned men, the work of our forces in Siberia. The reader of MACLEAN'S gets a broad idea of what Canada as a whole is doing. The value of this issue— and of all issues —is very great, therefore, from an educational standpoint.
MACLEAN'S is the one magazine that should be selected for young Canadians to read.

Four capital stories by famous authors—W. A. Fraser, Lloyd Osborne, Frederic S. Isham and C. W. Stephens.

The Review of Reviews

An unusually fine array of articles is given in this department, selected from the best in magazines and periodicals the world over. Some of the titles are:

Planned to Destroy British Fleet.
How Mackensen Was Caught.
Events of War Foretold by Stars.
What is Life Like Beyond the Grave?
A High-born Bolshevik.
The New Life in Dry America.
Germans Were Ready to Capitulate.
Japan's New Foreign Policy.
The Many Kings of Jerusalem.
Is British Foreign Office Against League?
Ambassador Tells Story of Peace Ship.
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SAYBOLT TUBES

SAWS

SAW GUARDS

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Kayser Ellison & Co., Ltd., Montreal.
Norton, Ralph P. Agency, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.

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Norton, Ralph P. Agency, Montreal.
Latrobe Electric Steel Co., Latrobe, Pa.
Canadian Allcyn Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

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Norton, Ralph P. Agency, Montreal.
Can. Drawn Steel Co., Hamilton, Ont.

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Norton, Ralph P. Agency, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.

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Can. Fairbanks-Morse Co., Montreal.
H. W. Dieter Co., Ltd., Montreal.
Smith & Sons, Thos., Montreal, Que.
Manhattan Rubber Co., Boston, Mass.
Crucible Steel Co. of America, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Pressed Steel Co., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Can. Drawn Steel Co., Montreal.
Canadian Allcyn Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Crucible Steel Co. of America, New York, N.Y.
Montreal, Que.

STEEL, GRIT
Pittsburgh Crucible Steel Co., Pittsburgh, Pa.

STEEL, CHROME AND MANGANESE
Canada Metal Co., Montreal, Que.

STEEL, OPEN HEARTH
Crucible Steel Co. of America, New York, N.Y.

STEEL, CRUSHED
Pittsburgh Crucible Steel Co., Pittsburgh, Pa.

STEEL, ROCK DRILL
Kayser Ellison & Co., Ltd., Montreal.
Norton, Ralph P. Agency, Montreal.

STEEL, SPECIAL ELECTRIC ALLOY
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STEEL, STRUCTURAL
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STEEL, TANADIUM
Canada Metal Co., Montreal, Que.

STEEL, TUNGSTEN
Canada Metal Co., Montreal, Que.

STOCK RACKS FOR BARS, PIPING, ETC
Vulcan Crucible Steel Co., Aliquippa, Pa.

STOCKS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.

STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.
Wells Bros. of Canada, Galt, Ont.

STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn.
Bertha, Ltd., Edinburgh, Scotland.

STRAND
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STORAGE AND HANDLING SYSTEMS FOR DRY CLEANERS, AND NAPHTHA
Bowser & Co., S. F. Inc., Fort Wayne, Ind.

SYSTEMS, RECLAIMING, FOR OIL
Bowser & Co., S. F. Inc., Fort Wayne, Ind.

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Bowser & Co., S. F. Inc., Fort Wayne, Ind.

SYSTEMS, PAINT, OIL STORAGE AND HANDLING
Bowser & Co., S. F. Inc., Fort Wayne, Ind.

SYSTEMS, OIL STORAGE AND DISTRIBUTING
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TANKS
Can. Ingersoll Rand Co., Ltd., Sherbrooke, Que.

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Greenfield Tap & Die Corp., Greenfield, Mass.
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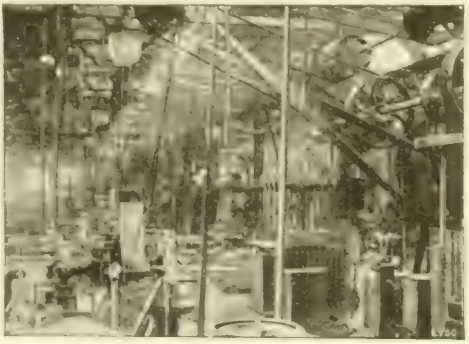
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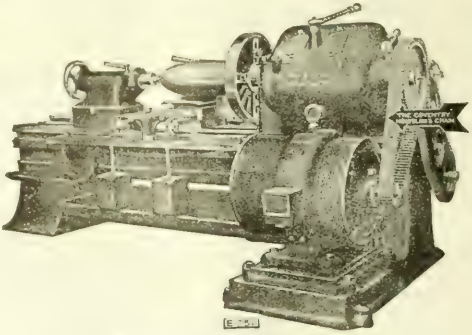
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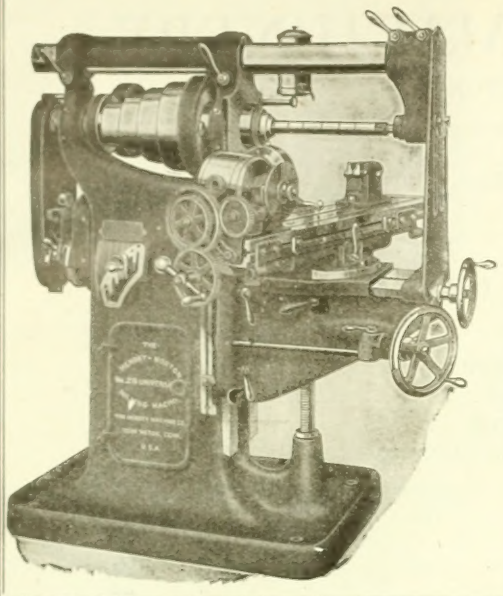
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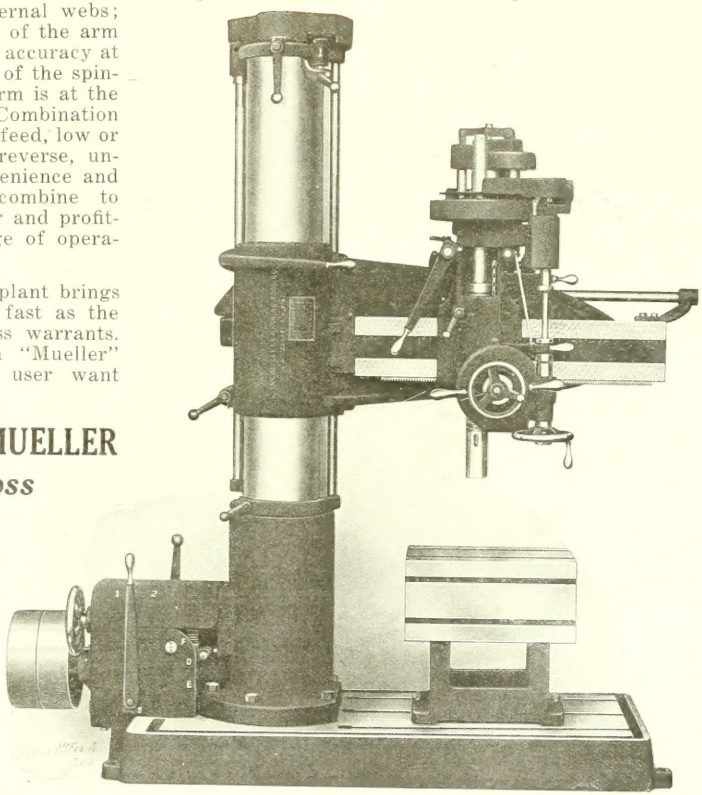
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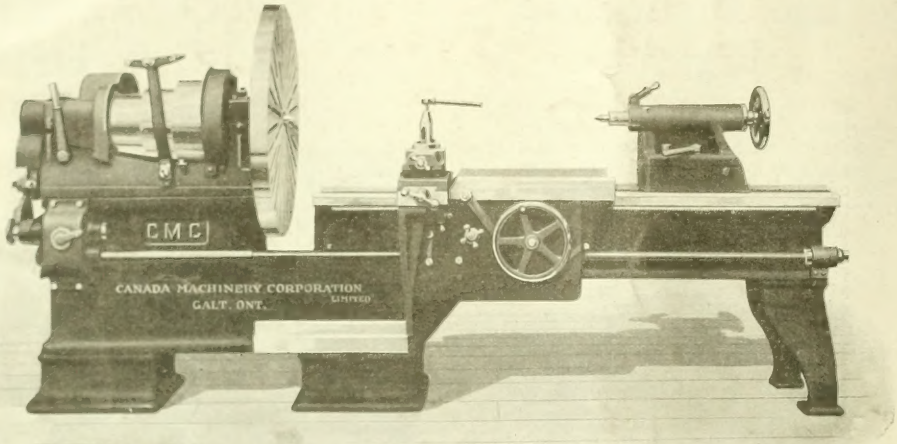
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